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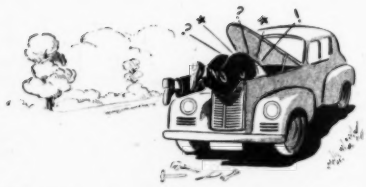
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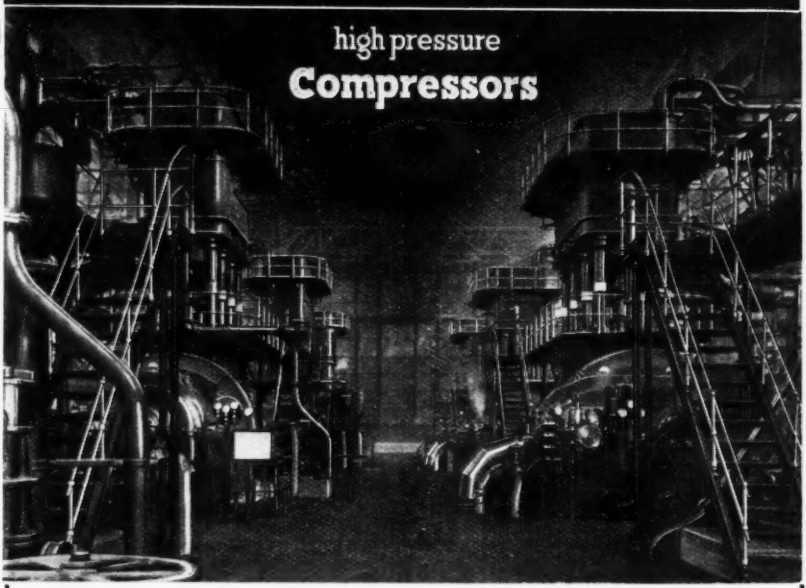
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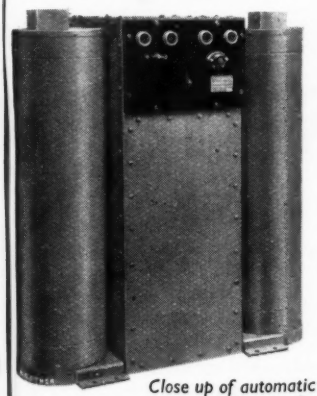


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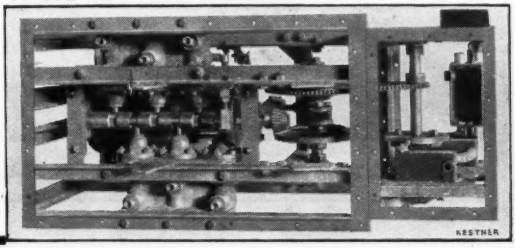
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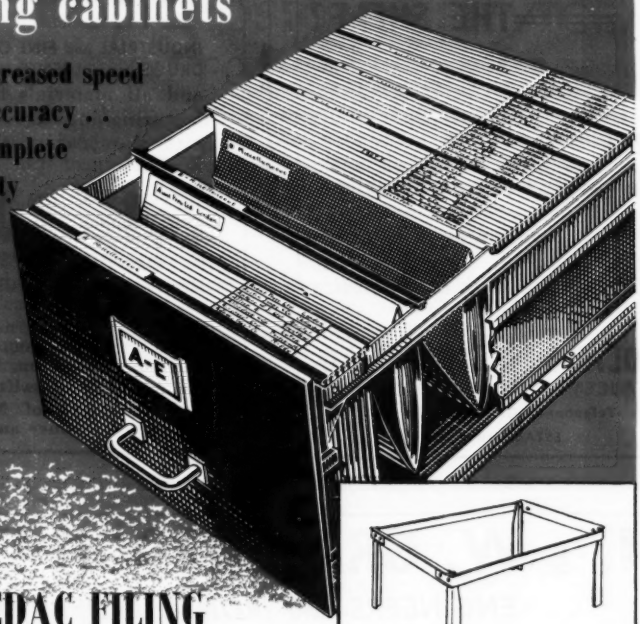
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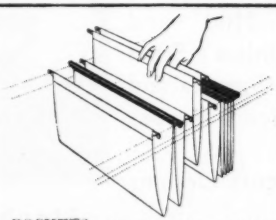
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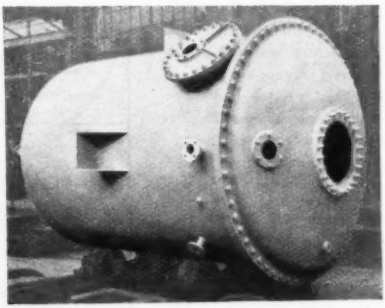
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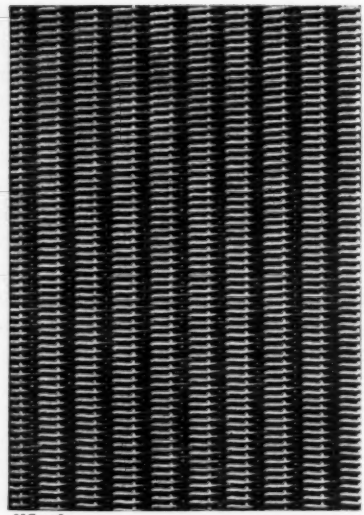
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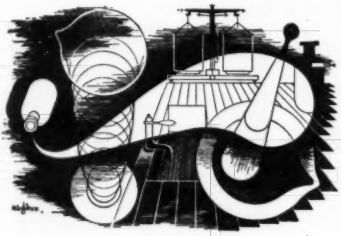
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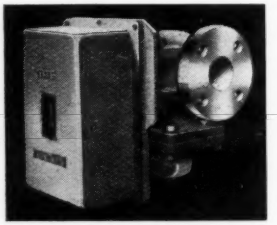
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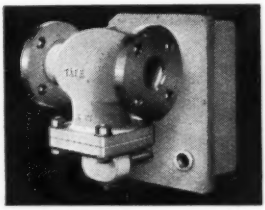
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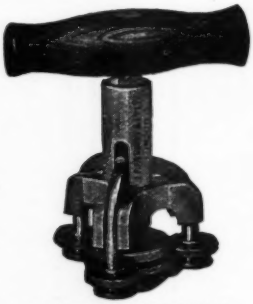
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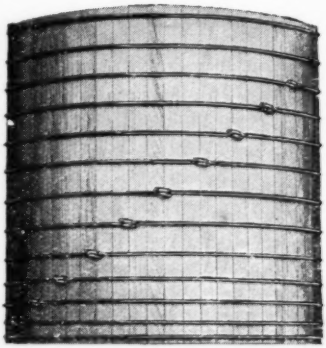
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New Fields for Lithium Compounds

LITHIUM is the lightest metal known. It has a specific gravity of 0.53 and an atomic weight of 6.94. The metal melts at 367°F. and has a boiling point of 2435°F. It appears in the periodic system of elements as the first number of Group I, above sodium and potassium; many of the lithium salts tend to resemble salts of the alkaline earth metals in chemical behaviour. The use of lithium salts in the ceramic industry as a constituent of enamels, enamel colours, glass and glazes is very well known; rather less familiar, however, is their application in the chemical industry. The significance of the new organo-lithium compounds in chemical synthesis has lately been gaining wide recognition, as the better known organo-magnesium compounds do not fully satisfy the requirements of the organic chemist.

Lithium hydride is one of the more interesting of these compounds. In the pure state it is a white, translucent, crystalline mass, and in its commercial form is light bluish grey in colour, due to the presence of a minute amount of colloidally dispersed lithium metal. When heated, the hydride ignites and burns with a gentle flame. It shows extreme avidity for water and is useful as a desiccant. When reacted with water, hydrogen is generated; one cu. ft. of LiH weighing about 50 lb. will generate 2250 cu. ft. of hydrogen reduced to 0°C and 760 mm. Lithium hydride is used in the preparation of lithium aluminium hydride ($LiAlH_4$) and in organic reactions, where it acts as a condensing agent.

Lithium hydroxide, a white, porous, granular powder with a melting point of 462°C., is one of the most powerful absorbents of carbon dioxide, one gram of LiOH will absorb about 0.8 gram (405 cc. at 0°C. and one atmosphere) of carbon dioxide gas, which is far higher than the absorptive power of any of the usual carbon dioxide absorbents. As lithium hydroxide has only a slight affinity for water there is no danger of its losing its effectiveness as a carbon dioxide absorbent during exposure.

Lithium hydroxide monohydrate, $LiOH.H_2O$, is available in the form of small colourless crystals. It is a strong base, similar in this respect to sodium and potassium hydroxide. Its most important use is in the alkaline electrolyte type of storage battery. With an electrolyte consisting of potassium and lithium hydroxide and plates of iron and hydrated nickel dioxide, this type of storage battery has found many applications in industry. In the chemical industry itself it is widely used in the preparation of other lithium salts where the use of the carbonate is not practicable. Another interesting use of the hydroxide monohydrate is in the preparation of lithium soaps, greases and waxes. The stearate, palmitate and oleate are three principal soaps which are incor-

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porated into these new and improved greases. The ability of these greases to withstand extremes of temperature without loss of their lubricating qualities is one of their most valuable qualities. They have been proved satisfactory at temperatures as low as 70°F. and do not break down at the high temperatures attained in modern high compression engines. The stearate and similar compounds are also being incorporated into certain types of waxes and the improved waxes are, in turn, being used in other fields such as certain types of printing inks. A more recent development has been the introduction of lithium hydroxide monohydrate directly into the grease kettle with the result that, in a series of steps through reaction with stearic acid, lithium stearate is formed *in situ*.

Lithium chloride, a white hygroscopic, granular powder with a melting point of 614°C. is one of the most important of the lithium salts. It is the starting material for the production of lithium, large quantities of which are now being used in metallurgy, particularly for the treatment of high conductivity copper and copper-base alloys. The chloride is freely soluble in water and a 40 per cent brine is used for de-humidification. In air conditioning systems this brine serves as a most important purpose in effecting close control of humidity. That is the common use, and there are others no less promising in industry, such as the provision of conditioned air in foundry cupolas and steel blast furnaces and now, probably, in the dehydration of foodstuffs. This readiness to act as an absorbent is a characteristic of several of the lithium salts, such as lithium nitrate, used widely to take up ammonia in refrigeration systems.

Lithium carbonate, probably the best-known of the lithium compounds, has established itself in the ceramic field by its facility for forming eutectics with other alkali oxides or with silica—a most useful characteristic in the production of glass of low expansion coefficient and high chemical resistance. It is used extensively as a base for the production of lithium acetate, bromide, chloride, citrate, phosphate, salicylate, etc., and in air conditioning the bromide exhibits some advantages over lithium chloride in that it can be concentrated to as high as 65 per cent without crystallising.

Before leaving the inorganic lithium salts it is as well to mention some of the very new compounds which so far have found uses only in ceramics. The first of these was lithium manganite, developed in

(*Continued on page 676*)

NOTES AND COMMENTS

Anti-Pollution Measures

THE courteous and helpful collaboration of a chemical manufacturing firm with the health authorities of the locality in which its works is situated, in seeking a solution of an atmospheric pollution problem, was deservedly given full recognition in a report presented at the last meeting of the Widnes Town Council. Councillor Mrs. Ethel Hanley, who read the report, said that a visit had been made by Dr. F. W. Bunting, the medical officer of health, and Mr. Starkey, the sanitary inspector, to the plant of Albright & Wilson, which they were shown over by Dr. Jones, the works manager, who assisted them to make an inspection. The report, which stated that Dr. Jones explained the processes carried on at the works, proceeded :—" There are two nuisances which, from time to time, occur at this works. One is a dust nuisance and the other is from the emission of a heavy gas. The dust nuisance is caused by tipping in the open air wagons containing phosphates. We were assured that this nuisance will be remedied in the future by the erection of a cover with movable doors to form a tipping room. Licences have been obtained for the necessary steelwork and roofing, and the work will commence when materials arrive. The gas nuisance occurs in the phosphorus recovery plant. The process produces a mud or sludge which contains phosphorus to such an extent that it would be dangerous to deposit it on a tip and also is worth cost of recovering. This mud is dried out in an electric furnace, and it sometimes occurs that an element in the furnace burns out before the recovery process is completed. To renew an element the lid must be taken off the furnace which allows the unfinished product, the white gas, to escape into the atmosphere" The report ended by stating that Dr. Jones informed the council's officials that experiments on a large scale were being carried out at the firm's Oldbury factory to eliminate this nuisance, and if they were successful, steps would be taken to make the necessary installations at the Widnes factory. " I might add," Councillor Mrs. Hanley concluded, " that they were received with every courtesy by the management, and the inspection convinced the medical officer of health that they were doing everything in their power to abate the nuisance." That such full and friendly collaboration cannot but operate in the desired direction was given confirmation by Councillor F. Traynor, who remarked that he would like to say definitely that there had been a better atmosphere in the neighbourhood concerned since the last meeting of the council.

Britain in World Trade

ONCE more Britain's goods are on display before the world at the British Industries Fair which opened this week in London, at Olympia and Earls Court, and at Castle Bromwich, Birmingham. The Fair gives a generous sample of British industries and marks the progress that has been achieved in quality and design. In the chemical section at Olympia there are slightly fewer exhibitors than last year, but the high standard of exhibits is well maintained. On the first day attendance of both overseas and home buyers showed an increase which augurs well for the success of this year's Fair. The high esteem in which British laboratory instruments are regarded, in spite of keen foreign competition, was reflected in a £300,000 order for Iran in connection with that country's new health scheme. British plastics also came in for their share of praise from visitors who declared them to be the equal of American products. The chief aim of the show must, of course, be the export market, and Mr. Harold Wilson, President of the Board of Trade, at the dinner given at the Mansion House to mark the opening of the Fair, emphasised the difficulty which was to be expected in keeping up the high records attained in January and March this year. Mr. C. D. Howe, the Canadian Minister of Trade and Commerce, who was the guest of honour, stated that the Dominion was a great potential market for primary materials from the colonial areas while he deplored the tendency for " non-dollar " countries to trade among themselves. One fruitful field for greater export activity, he pointed out, was the

machinery equipment and replacement parts, of which last year only £7 million worth came from Britain, compared with £109 million from the U.S.A.

Differential Thermal Analysis

RESEARCH tools developed within a particular restricted field often prove to be of great value in completely different departments. Unfortunately it is usually a matter of years before the wider possibilities of such a development become fully appreciated. A case in point is the technique of differential thermal analysis, in which increasing interest has been manifest in the last few months. This technique has long been known and used by ceramics workers and has had a limited application in metallurgy. Its scope both as a research tool and as a means of carrying out rapid routine checks on the raw materials used in all kinds of inorganic solid reactions has yet to be exploited. In essence the technique provides a rapid method of detecting the occurrence of exothermic and endothermic reactions in solids, and of estimating the magnitudes of these thermal effects. Powdered samples of about 1 g. of the test material and of a thermally inert substance such as recrystallised alumina are placed in adjacent recesses in a ceramic block contained in a furnace. Thermocouples embedded in the samples indicate both the actual temperature of the inert material and the difference in temperature between it and the test sample. The thermocouples are connected to an automatic recorder so that throughout the period of heating a permanent record is obtained both of the furnace temperature and the difference in temperature between the two samples. When an endothermic reaction occurs, for example, the loss of water from a hydrate, the test sample is at a lower temperature than the inert material until the reaction is complete, and a peak is produced on the record of the difference temperature. The area under the peak is related to the quantity of heat absorbed in the reaction. In the ceramic industry this technique has been used mainly for the identification of the constituents of mixed clay minerals, each mineral having a characteristic sucession of endothermic and exothermic peaks. In other fields in which the behaviour of solids at high temperatures must be studied the possible applications of the technique are at least as promising. Differences in the reactivities of raw materials, which may be identical to the analyst, can be readily detected.

NEW FIELDS FOR LITHIUM COMPOUNDS

(*Continued from page 674*)

1945, and found to be of outstanding value in porcelain enamels. The manganite possesses excellent resistance to heat, and in tests it has been found to resist temperatures of 1100°C. for long periods without melting; moreover, during heating no decomposition producing measurable oxygen loss was observed. Recently, lithium manganite has been found to be of value for decolorising glass contaminated with iron. Compounds of lithia with the oxides of aluminium, antimony, boron, cobalt, molybdenum, silica, titanium, and zirconium, as well as with zircon, have all been prepared.

One of the important organic compounds of lithium is lithium amide, the white crystalline substance melting at 380-400°C. and having a density of 1,178 g./cc. at 17.5°C. It decomposes in water ($LiNH_2 + H_2O \rightarrow LiOH + NH_3$) and the decomposition rate increases with decreasing particle size. Unlike sodium amide, the lithium compound is stable under normal storage conditions. To the organic chemist the amide is of interest in Claisen condensation; alkylation of nitriles and ketones, synthesis of ethinyl compounds and the synthesis of acetylenic carbinols. From the same standpoint the organolithium group, more reactive than the organo-magnesium compounds, is deserving of more attention from the chemist. They may be used in many processes where Grignard reagents act either too slowly or not at all. They add to the carbonyl groupings of esters, ketones and aldehydes as do the Grignard reagents, and in association with diketones and dicarboxylic-acid esters they are far superior to the magnesium compounds. For example, the conversion of dimethyl phthalate to o-bis (diphenylhydroxymethyl) benzene is completely unsuccessful with phenyl magnesium bromide but proceeds to a 90 per cent yield with phenyllithium (Wittig. G., and Leo, *M. ibid*, 642,305 (1931)).

Parliament and Science

Utilisation of Resources

THE importance of the "Fourth Point" of President Truman's inaugural address was one of the main items discussed at the last meeting of the Parliamentary and Scientific Committee held on April 12.

A sub-committee was formed to consider how British science and technology could take a prominent part in this campaign; and how best, under the President's plan, American technology and capital could help in the application of science for the development of backward areas within the British Colonial territory, and what steps from the British side could be taken.

A general committee was arranged for Tuesday, May 24, to which experts from the Timber Development Association and the Aluminium Development Association had been invited to deliver addresses on the better utilisation of wood and light alloys in constructional activities in this country.

UNO Conference

The question of the need for some member of the committee to attend the important United Nation's Organisation conference at Lake Success in August on the conservation and utilisation of resources was discussed. In reply to a letter from Mr. A. R. Blackburn, M.P., the Lord President of the Council agreed that it was desirable for the committee to be represented, although it was not possible to place any public funds at its disposal for this purpose.

The chairman offered to attend and this was unanimously agreed.

In connection with the Fourth Empire Mining and Metallurgical Congress to take place in July, it was decided to hold a reception at the House of Commons on Monday, July 11, from 4.0-5.0 p.m.

Referring to the Patents and Designs Bill it was agreed that the secretary should send a copy to the secretaries of scientific bodies to find out whether they had any useful comments to make before the Bill came to the House of Commons.

Questions were raised regarding the inadequacy of scientists' salaries offered by the Railway Executive, compared with those paid for executive posts. Lord Marley referred to a sub-committee of which he was chairman, which was considering the methods of making appointments in nationalised industries.

The importance of standards in relation to productivity and exports was emphasised by Mr. Percy Good, director of the British Standards Institution.

Fertiliser Control to End

Nitrogen Shortage No Longer Acute

THE Food and Agriculture Organisation of UNO, implementing the recommendation of the International Emergency Food Committee, has announced that the international allocations of nitrogen fertilisers will be discontinued from June 30 this year, although present allocations will continue to be honoured until then.

Estimates of world production of nitrogenous fertilisers foresee a total for 1949-50 of approximately 3.77 million metric tons actual nitrogen, as compared with 3.16 million metric tons in 1948-49. According to FAO, current estimates indicate that there will be no acute shortage of fertiliser for essential needs in 1949-50. This accepts present production estimates as the determining factor.

While free distribution will not solve all the problems of scarcity areas, in the opinion of the Committee on Fertilisers, continuing allocations would not affect a really equitable distribution, and the preservation of the allocation system beyond the current fertiliser year would accomplish little of real value.

GAMMA RAYS FOR INDUSTRY

AN important advance in British technology is marked by the Ministry of Supply announcement that radium and radon, sources of highly penetrative gamma rays, can now be supplied for industrial radiography.

Radiography, which is the most versatile of all non-destructive testing techniques, makes use mainly of X-rays and gamma rays. The penetration power of gamma radiation is stated to be comparable with that of the most powerful X-ray apparatus at present available for industrial radiography.

Radium, which is best suited to factories where there is constant radiographic work will remain the property of the Government. It can be hired for periods of not less than six months, and the average time to fulfill an order is two months.

Radon, however, is sold outright, and only one week's notice of an order is required. Both radium and radon are supplied by the Radiochemical Centre, Amersham, to which applications for purchase or loan should be addressed.

Demonstrations of gamma radiography for industrialists may be seen by appointment at the Ministry's Armament Research Establishment, Woolwich, and at the National Physical Laboratory, Teddington.

The Textile Institute

New Council Members Elected

RESULTS of the Textile Institute's annual postal ballot for vacancies on the council showed five new members among the 11 elected. They were: H. S. Bell (head of the department of Textile Industries, Huddersfield Technical College); Walter English (director of Brough Nicholson & Hall, Ltd., Leek, and honorary secretary of the institute's Macclesfield, Leek & District Section); Dr. J. G. Martindale (principal of the Scottish Woollen Technical College, Galashiels); Dr. David Traill (division director, Nobel Division, I.C.I., Ltd., Ardrossan), and Dr. C. S. Whewell (senior lecturer in textile chemistry, department of Textile Industries, Leeds University). Retiring members re-elected were: John Boulton (head of research and chief chemist, Courtaulds, Ltd., Droylsden, Manchester); A. F. W. Coulson (director, R. Greg & Co., Ltd., Stockport); W. Crossley (managing director, The Yorkshire Dyeing & Proofing Co., Ltd., Middleton, Manchester); C. H. Edwards (head of department of Textiles, Nottingham & District Technical College); J. S. Nasmith (executive manager, Universal Winding Co., Manchester), and E. M. Walker (chemist and analyst, N. Corah & Sons, Ltd., Leicester).

NEW WELDING TECHNIQUE

GOOD results are reported of a new U.S. procedure for welding 4-6 chrome pipe using conventional welding equipment. It was devised for use in connection with the installation in a large Texas oil refinery.

A large preheating tip with oxyacetylene is used first to bring the temperature of the joint up to 600-800°C. and maintain it while the welding is done using a G.E.C. chrome electrode. The temperature is then raised to 1200-1350°C. and the joint is wrapped with asbestos tape to a minimum thickness of 1 in. and cooled to room temperature. The technique is said not to make weld metal so hard that it becomes brittle. Laboratory tests certified by the Shilstone Testing Laboratory of Houston are stated to show an ultimate tensile strength of 73,200 p.s.i., and a satisfactory rating on a 180 degree root bend. Brinell hardness in the weld was indicated as 248 and Brinell hardness in the pipe 174. Chemical analysis of the weld metal showed 7.73 per cent Cr. in the weld and 4.53 per cent Cr. in the pipe. The Houston Pipe & Steel Company, Inc., Houston, Texas, is the originator of the process.

Science and Industry

Prof. W. Cumming's Appointment

PROF. W. M. CUMMING has resigned from the position of director of the school of chemistry in the Royal Technical College, Glasgow, to take up his duties in the autumn as technical director to the British Dyewood Co., Ltd., Glasgow. After industrial experience in the British Dyestuffs Corporation, Huddersfield, Prof. Cumming joined the staff of the Royal Technical College as senior lecturer in organic chemistry in 1920 and was promoted to the Young chair of technical chemistry in 1933. He has published widely on various aspects of chemistry and chemical technology and undertaken research on many subjects for national bodies. During his association with the Scottish Council (Development and Industry) the professor was chairman of the committee on the chemical industry, and member of the committee on the plastics industry of Scotland whose reports were published last year. He instigated and is supervising the investigations to enable smaller firms to make better use of the services and information of large research organisations.

Kaylene, Ltd.

We regret that a mistake was published on page 656 of our issue of April 30, where it was stated that The General Chemical & Pharmaceutical Co., Ltd., was the occupier of Stand No. B55 at the Olympia section of this year's British Industries Fair. This is, in fact, the number of the stand held by Kaylene, Ltd., of Waterloo Road, London, N.W.2, who are manufacturers of analytical reagents and research chemicals, organic reagents, fine chemicals, electroplating and industrial chemicals, intermediates, pharmaceutical chemicals, antacids, adsorbents, antipyretics, camphor derivatives, lithium salts, general pharmaceutical preparations, emulsions, tablets, powders, etc. The General Chemical & Pharmaceutical Co., Ltd., is not exhibiting at this year's BIF, and we tender full apology to both firms concerned for our error.

Air Pollution Tests.—Observations in the area of Meaford power station, Stone, Staffs., in the last six months, show that there is not excessive pollution of the atmosphere. Further tests are to be taken to confirm the accuracy of these reports as there are plans for more power stations in the same neighbourhood.

STRUCTURE OF THE INOSITOLS

Suggested Genetic Relationship of the Isomers

THE inositols are widely diffused both in the animal and vegetable kingdom and belong to the large group of cyclohexane compounds wherein they are of special stereochemical interest (*see* Karrer's *Organic Chemistry*, 3rd Eng. Edit., pp. 648-9). Some account of the history of their discovery and distribution in their various isomeric forms has recently been given by Prof. A. Contardi, an early worker in this field (*La Chim. e l'Ind.*, 1949, *31*, 37-41) as an introduction to a series of lectures on some cyclohexane derivatives. (The name inositol is derived from the Greek word meaning muscle.)

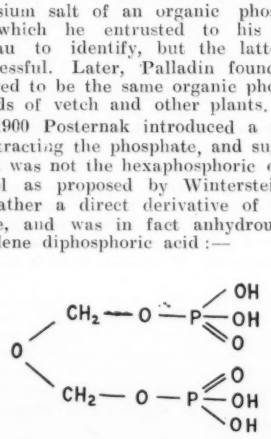
Much of the earlier history, beginning with Scherer in 1850-51 and continuing with Städler and Frerichs, Girard, Posternak, Contardi, etc., was reviewed by H Müller (*Jnl. Chem. Soc.*, 1912, *101*, 2383). Müller obtained what appeared to be a new isomer from the seeds of *Coccus plumosa* to which he gave the name cocosite; but it was subsequently found that this was identical with the scillite (scyllitol) of Steadler and the sennite of Vincent.

Müller also prepared artificially other isomers: iso-inositol and pseudo-inositol. It was soon realised that the inositols were of considerable physiological importance in both animals and plants.

Early Identifications

As early as 1872 Pfeffer had found in the aleurone of the wheat kernel a calcium or magnesium salt of an organic phosphoric acid which he entrusted to his friend Brandau to identify, but the latter was unsuccessful. Later, Palladin found what appeared to be the same organic phosphate in seeds of vetch and other plants.

In 1900 Posternak introduced a method for extracting the phosphate, and suggested that it was not the hexaphosphoric ester of inositol as proposed by Winterstein, but was rather a direct derivative of formaldehyde, and was in fact anhydrous oxymethylene diphosphoric acid :—



and that inositol is only formed during hydrolysis.

The calcium or magnesium salts of this acid were introduced on a commercial scale under the name Fitina by the Soc. Chem. Ind. of Basle; and about the same time Contardi himself confirmed the views of Posternak (1909-1910) and obtained a similar product from rice bran by a method which was acquired by the Soc. Chem. Ind. of Basle. Contardi also synthesised Fitina from inositol and phosphoric acid (*Gazz. Chim. Ital.*, 1912, *42* (I), 408).

Fitina

Fitina is easily hydrolysed, by heating with dilute mineral acid, or by means of a special phosphatase found in cereals (phytase), or by other enzymes found in the animal organism. From a physiological standpoint Fitina may be said to substitute inositol.

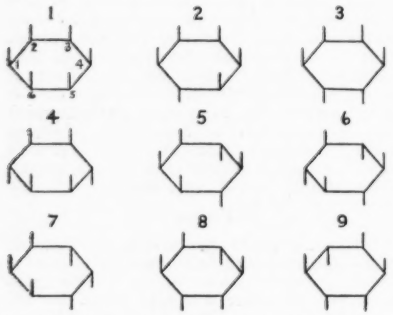
As already intimated, the biological importance of the inositols was appreciated at an early date. Soave, for example, had fairly thoroughly investigated their rôle in the germination of seeds in 1906, and concluded that they were an important source of phosphorus to the plant, as well as of carbonaceous material. There is little doubt to-day that they have valuable catalytic and vitaminous functions.

Further progress in this direction was made by the important researches of E. V. Eatscott, R. J. Anderson, J. Folch, and D. V. Woolley. Among other things an appreciable amount of meso-inositol was found in yeast, where it plays an essential physiological rôle; and inositol was discovered as a constituent of the phosphatides of the brain in higher animals. It may thus enter the mechanism of lipid transformation.

The relative inertness of inositol to chemical reagents, and consequent difficulty of analysis, was largely overcome by the valuable work of Woolley and co-workers in discovering a workable biochemical method of quantitative analysis (*J. Biol. Chem.*, 1941, *140*, 453). Among other things, as a result of this work it was concluded that the inositols are essential constituents of the vitamin B group.

Contardi discusses the stereochemical structure of the inositols in connection with the earlier views of Maquenne and Bouveault (1887-1894), reproducing the nine forms shown, *e.g.*, in Karrer (*loc. cit.*), and here also, below, with upstrokes representing hydroxyls in the *cis-* position and down-

strokes those in the *trans-* position. These isomeric forms are discussed in some detail in connection with the relevant literature, and with particular reference to the meso-inositol, the racemic inositol, and the iso-inositol.



5=meso−; 6=scyllitol−; 8=lævo−; 9=dextro−

In regard to the meso-inositol, some important work was done on this by S. and T. Posternak in 1929. They succeeded in isolating from products of hydrolysis of Fitina obtained by action of phosphatase, first a tetra-phosphoric ether of inositol which proved to be lævo-rotatory, thus excluding formula 1; and then, continuing the enzyme reaction, they obtained successively the tri- and biphosphate, both optically active, and finally the monophosphate which was inactive, identical with that described by Anderson.

These authors excluded the possibility of 3, but Contardi thinks this could well be included, as well as 2, 4, 5 and 7. By oxidation in alkaline medium in the cold (0°C.) they isolated an acid which Fischer earlier had taken to be allomucic, but which Th. Posternak subsequently showed to be the talo-mucic acid (*Helv. Chim. Acta*, 1935, *18*, 128; 1842, *25*, 746). It finally appeared that only 2 and 5 formulæ could apply to the meso-inositol; and further that scyllitol must have the formula 6.

Racemic Inositol

The racemic forms are also of considerable interest. In 1907 Tanret had found a racemic form of inositol in mistletoe berries in fairly substantial amount. From 1 kg. of the berries he obtained 4 g. of racemic inositol and 12 g. of meso-inositol, partly explainable from the fact that the mistletoe is a parasitic plant.

Other plants of this kind, *e.g.*, *Coccus cacti*, show high contents of inositols. Some of the characteristics of the racemic form are given, including its crystal structure, optical inactivity, and melting point of 253°; also its behaviour in nutrient for *Aspergillus niger*, showing difference in behaviour of the *lævo-* and *dextro-* forms.

The isomer iso-inositol appears to have been first obtained in 1892 by Flint & Tollens, but more definitely by Müller (*loc. cit.*), in both cases by heating meso-inositol with anhydrous acetic acid saturated with dry HCl gas. The new isomer was found to be optically inactive and had a melting point of 250°C.

Another isomer to which the name pseudo-inositol was assigned could not be very definitely characterised. The starting material could be also scyllitol. Differences in crystalline form between these isomers, according to the Barker technique, are briefly noted.

Finally, Contardi considers some of the transposition possibilities. He thinks that Müller's results were a racemic form of inositol, and that the importance of the iso-inositol form has not been sufficiently appreciated. It was, in fact, the first example of the fact that at least one hydroxyl could be transferred from one plane to the other without destroying the essential molecular structure.

Genetic Relation

This is the more interesting since it supports the probability of a genetic relation between the various isomers, that, for example, the meso-inositol or scyllitol may readily pass into the racemic form, equally well with either the lævo- or dextro- or dextro-inositol. The racemic form is undoubtedly the most stable.

It appears evident, too, that the transformation of the optically inactive inositols into a racemic structure is relatively easy, from consideration of the various formulæ given above and the position of the hydroxyls, leading also to the conclusion that the two optically active inositols could be racematised, hitherto considered extremely doubtful.

Contardi's present research includes the confirmation or otherwise of this point. He indicates the interesting analogy with hexahalogen derivatives of cyclohexane, including the highly important insecticide Gammexane.

In this connection, and referring to views expressed by R. E. Slade (*Chem. and Ind.*, 1945, *63*, 314), many questions arise. Does Gammexane undergo the same changes as meso-inositol and scyllitol? Is the racemic form of hexochloro-cyclohexane to be included? And what is its physiological function?

B.I.F. NEWS AND VIEWS

Reports from Exhibitors in Chemicals Section



General view of the Chemicals Section at Olympia

THERE are upwards of 3000 exhibitors at the 28th British Industries Fair which opened last Monday for 11 days at Earls Court and Olympia (London) and Castle Bromwich (Birmingham).

A new British export industry is launched at the atomic energy exhibit in the scientific section at Olympia. This is the production of artificial radio-active isotopes for use in industry, medicine and research, which is being carried on at the Atomic Energy Research Station, Harwell, Bucks.

"C.A." STANDS

THE CHEMICAL AGE *is again represented at London and Birmingham on the stands of its proprietors, Benn Brothers, Ltd., where all information relating to the journal, "The Chemical Age Year Book," and the many other affiliated industrial publications is available.* THE CHEMICAL AGE *is to be found at these stands:—Earls Court, No. V.5 (Fulham* 8996). *Olympia, No. A.13 (Renown* 5148). *Castle Bromwich, No. A427 (Fair* 213).

Questionnaires sent to exhibitors have been analysed on return with a view to extracting (1) details of trends in demand overseas and of how British firms are meeting those demands, and of their ability to square up to foreign competition; (2) details of new inventions, developments or novelties which firms are exhibiting at this year's Fair. The information received from exhibitors in the Chemicals Section at Olympia at the time of going to press, as regards trends and competition, is as follows:—

Marchon Products, Ltd., Kells, Whitehaven, Cumberland (Stand B23), states that now its new drying unit capable of producing 15,000 tons per annum of powder to practically any desired specification is in full operation, it can produce high quality powdered detergents at prices which will compete with the best foreign products in any part of the world.

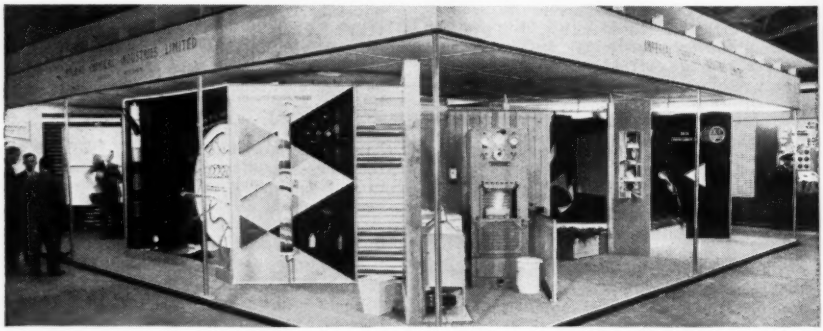
Boots Pure Drug Co., Ltd., Station Street, Nottingham (Stand B2), states that it is producing special zonal packs for export of pharmaceuticals such as tonics, eye lotions, antacids, laxatives and influenza mixtures. One will be a general

(*Continued, after two picture pages, on page* 684)

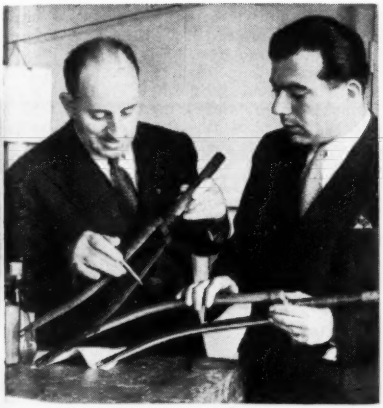




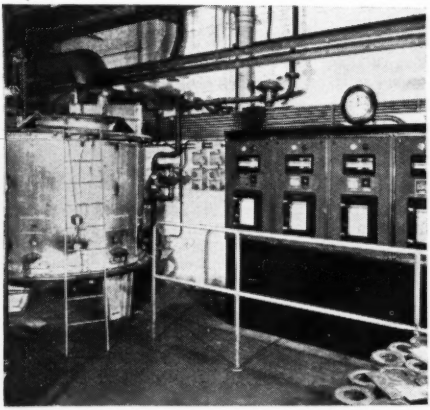




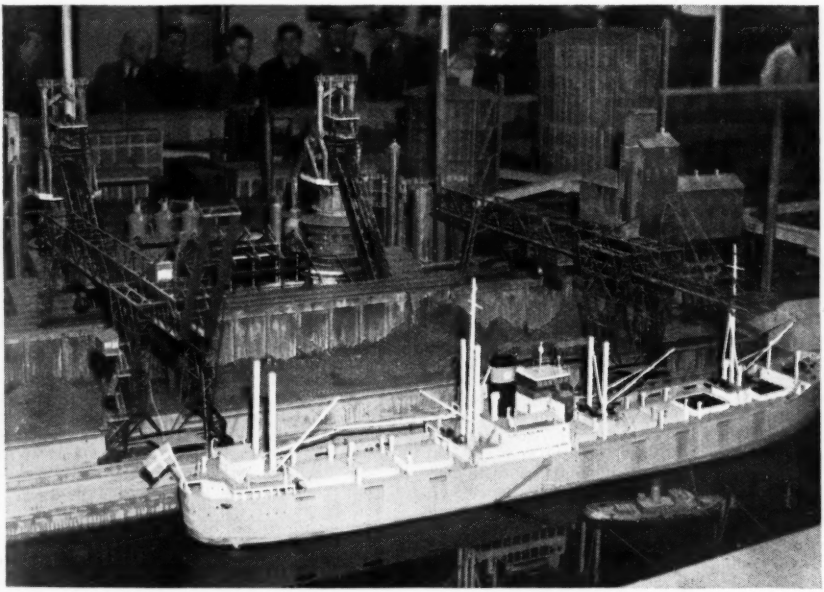
Some of the effective displays at the British Industries Fair, London. Top : Monsanto Chemicals, Ltd., London (Stand B.19). Centre : (Left), Brotherton & Co., Ltd., Leeds (Stand B.14), and (right), Laporte Chemicals, Ltd., Luton (Stand B.37), all at Olympia. Below : Imperial Chemical Industries, Ltd., Plastics Division, Welwyn Garden City (Stand X.21 and X.34), at Earl's Court



Mr. John H. Lawrence, managing director (right), and Mr. J. V. Bishop, sales manager, discussing the jenolising rust remover and neutraliser process demonstrated by Jenolite, Ltd. (Stand B.221) at Birmingham



General heat-treatment shop with forced air circulation tempering furnaces and Electroflo Meters Co. installations. Part of the British Gas Council's comprehensive exhibit at the Castle Bromwich, Birmingham section



A model steelworks with an ore ship unloading its cargo into the stackyard. An exhibit sponsored by the British Iron and Steel Federation in the Engineering and Hardware Section of the B.I.F. at Castle Bromwich, Birmingham

B.I.F. NEWS AND VIEWS

(*Continued from page 681*)

export pack with carton, leaflet and labelling all in English, while the other four packs will be multilingual. In each of the multilingual packs English and a number of other languages are used, the foreign languages having been selected on the recommendation of buyers and sellers in the overseas territories where the products will be sold.

Edward Gurr, Ltd., 108 Waterford Road, Walham Green, London, S.W.6 (Stand B53), is going after export markets with a range of biological stains and reagents essential in the study and control of such diseases as malaria, leprosy, tuberculosis, cancer and sleeping sickness which the firm describes as "probably the most comprehensive in the world." Evidence has reached the firm that users regard the products as superior in quality to former German products hitherto regarded by laboratory workers as world leaders for reliability and quality. To meet American export competition the firm has recently started manufacturing water soluble hydrogen ion indicators in tablet form. These are used to indicate acidity and alkalinity in laboratory work. The firm's price is stated to be "very considerably lower" than that of similar products manufactured in America.

Raw Material Prices

British Industrial Solvents, Ltd., 4 Cavendish Square, London, W.1 (Stand B26), states that because of decreases in raw material prices and increases in the firm's scale of production and efficiency of processing, the cost of a number of its major products has been reduced to the extent where it is possible to compete with U.S. production in certain fields.

Laporte Chemicals, Ltd., Kingsway, Luton, Beds. (Stand B37), states that large overseas demands for hydrogen peroxide will be met by a new factory in course of construction at Warrington. The site covers 30 acres and the plant will be the most up-to-date that modern research and ingenuity can devise. The new factory is expected to be in production early next year, when hydrogen peroxide of all strengths and of high purity and stability will be manufactured in addition to numerous peroxy compounds. In the meantime, current demands for hydrogen peroxide and peroxy compounds will be supplied from the company's factory in Bedfordshire. The same company is now manufacturing barium chloride on a large scale at a new plant in Yorkshire.

New developments in the chemicals sphere are reported upon as follows:—

A wartime fire extinguishing component, which has now been adopted as a fumigator of seeds required for the East African groundnut scheme, is shown by May & Baker, Ltd., Dagenham Essex (Stand B47). The component is methyl bromide, which forms part of the extinguisher carried by every aircraft of the RAF during the last war. The chemical can now be used for the fumigation of such things as seeds, dried fruit, cereals and tobacco. Another item to be shown by the same firm is a hormone which makes it possible to grow grass free of weeds.

A new optical bleaching agent, which has affinity for all fibres but is specially effective on wool and other animal fibres, is shown by L. B. Holliday & Co., Ltd., Deighton, Huddersfield (Stand B30). The new agent is stated to be superior to all other products developed for bleaching purposes and is claimed to be of great value to the textile and allied trades. It may also be applied in conjunction with dyestuffs to give purer and brighter shades. The commodity will be available in paste or powder form which the firm claims will be harmless to the most delicate fabrics.

A lye manufactured by A. Boake, Roberts & Co., Ltd., Arbrac Works, Stratford, E.15 (Stand B33), is shown, which has been used with great success to replace German products supplied in pre-war days. This lye has been introduced as an absorption agent for weak acidic gases and has proved entirely satisfactory for the removal of hydrogen sulphide and carbon dioxide from hydrocarbon gases. After the lye becomes saturated with the bases they are removed by boiling, when the lye is then ready for use again in absorbers. Only the minimum amount of heat is required to remove the gases and thus regenerate the lye, which has good corrosion characteristics and in most cases can be used in existing plant.

Detergents

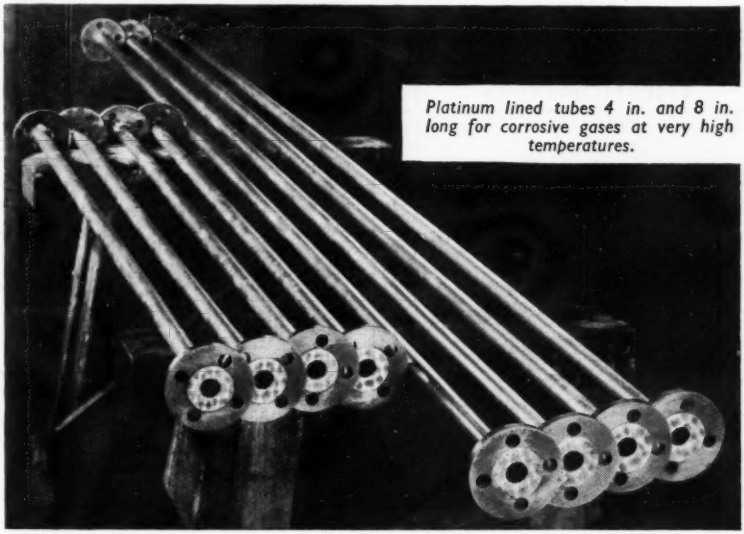
Marchon Products, Ltd., Kells, Whitehaven, Cumberland (Stand B23), presents examples of products from its new drying unit, the largest installation of its kind outside the U.S.A. The chemical nature of the detergents produced is mainly scientifically built alkyl aryl sodium sulphonates, but owing to the flexibility of the installation the firm is also able to offer fatty acid condensation products, sulphated primary and secondary alcohols, etc., produced in powder form, ready for industrial consumers, such as textiles, laundries, etc., or at a decreased bulk density as dust-free granules, to be packed for domestic use.

A substance which was experimented with for possible use as a war gas has been

(*Concluded on page 706*)

Metallurgical Section

Published the first Saturday in the month



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Further information regarding the engineering properties and uses of platinum are contained in Data Sheet 2030, sent on request.

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Metallurgical Section

7 May 1949

CHROMIUM-NICKEL STEELS

Influence of Temperature on Mechanical Properties

CONTINUING its broad research programme on the influence of low temperature on the mechanical properties of metals and alloys, the U.S. National Bureau of Standards' current investigations, dealing with austenitic 18 : 8 chromium-nickel steels down to minus 188°C., are expected to provide significant data on flow, fracture, and ductility characteristics. Information on the low temperature properties of these steels has hitherto been meagre.

Steels of 18 : 8 chromium-nickel composition, both with and without additions of molybdenum, titanium, and columbium, are included in the current investigations, which involve tests in annealed and cold-drawn conditions. When such steels are annealed (cooled rapidly from about 1900°F.), they are austenitic. If they are cold-worked, however, some of the austenite transforms to ferrite containing carbon in supersaturated solution.

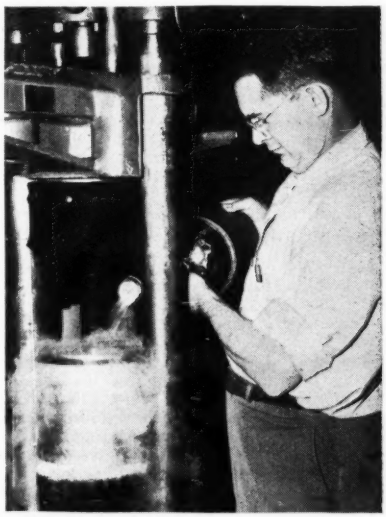
Resistance to Oxidation

Although the metastable condition of these steels is undesirable for certain applications, their remarkable strength and toughness make them suitable for many types of service, especially when high resistance to corrosion and oxidation is required. A ferritic 18 : 8 steel of the precipitation-hardening type was also included in the study.

The mechanical properties of the steels were determined by tension tests with circumferentially notched and unnotched cylindrical specimens, using a pendulum-hydraulic testing machine of 50,000 lb. capacity. Tests at low temperatures were conducted with the specimens submerged in a refrigerant bath maintained at the selected temperature.

In the special apparatus devised for these tests, the lower threaded end of a specimen extends through the bottom of a cylindrical-shaped vessel, containing the refrigerant, into the lower adapter of the testing machine. Lead washers are used to seal against loss of the liquid bath.

To obtain a temperature between room heat and −78°C., a mixture of equal parts by volume of carbon tetrachloride and chloroform is cooled by pulverised solid carbon dioxide. Temperatures between −78°C. and −188°C. are obtained with liquid dichlorodifluoromethane (CCl_2F_2) (Freon 12), which is cooled by pouring liquid air into the end of an immersed copper coil while the refrigerant is being constantly stirred.



Testing the mechanical properties of 18:8 chromium-nickel steel at −188°C in a bath of liquid air

A chromel-alumel thermocouple attached to the specimen permits accurate control at the desired temperature. For a temperature of −188°C., the specimen is fully submerged in a bath of liquid air.

In these investigations the tensile load was applied more slowly than is usual in a tension test to avoid local heating of the specimen during the plastic deformation. The

duration of the test was generally about one hour. Simultaneous load and diameter measurements were obtained throughout the duration of the tests at room temperature, and the flow stress curves were derived directly from these measurements.

Since diameter measurements could not be obtained during the tests at low temperatures, automatic load-extension diagrams were obtained from the head movement of the tensile machine. The flow-stress curves were derived from these diagrams.

Rapid Phase Change

Plastic deformation of the metastable austenitic steels during the tension test causes some of the austenite to transform to ferrite containing carbon in supersaturated solution. The rapidity of this phase change, which hardens and strengthens the steel, increases as the temperature is lowered.

The automatic load-extension diagrams from the tension tests give clear evidence of phase change during the plastic deformation. The curves plotted from data taken in tests at room temperature are qualitatively similar to those obtained with a metal that does not undergo phase changes with plastic deformation. The slope of the curve decreases continuously between the points representing yield and maximum load.

Transformation from austenite to ferrite during plastic deformation in the tension test at room temperature is not sufficient to cause a qualitative change in the form of the curves. The load-extension diagrams at −78° and −188°C., however, give evidence of a rapid phase change at these low temperatures. Some curves plotted from test data at −78° were found to exhibit a reversal of curvature with a rapid increase in slope beyond the point of reversal, showing that the strengthening during plastic deformation is due not only to the ordinary work-hardening, but also to hardening caused by the phase change.

Plastic Strain

Other load-extension curves at −78°C. and curves at −188°C. clearly reveal still more evidence of the phase change. From the region representing the beginning of plastic strain, the curve rises with continuously decreasing slope to a maximum. The descent beyond the maximum represents the effect of incipient local contraction. However, the local contraction and consequent descent is stopped by a rapid phase change.

The influence of the strengthening due to this phase change then becomes dominant, causing the curves to rise to a second maximum. This second maximum point represents the beginning of final local contraction, and the curves descend to the point representing fracture of the specimens.

These investigations, therefore, show that six strength indices are sometimes required to evaluate the mechanical properties of these steels. The indices are: Yield stress, first ultimate stress, stress at a reversal in the load-extension curve, stress at a minimum in the load-extension curve, second ultimate stress, and the true fracture stress.

The hardening and strengthening of 18 : 8 steels at low temperature depend greatly upon the amount of prior plastic deformation (cold working) the steel has received at room temperature. The increase in strength is greatest for the annealed steel and falls off with increase in the amount of prior plastic deformation at room temperature.

The metastable austenitic steels have good ductility. Even at temperatures as low as that of liquid air the ductility, as determined by reduction of area, is about as great as at room temperature. In this respect they are similar to non-ferrous metals having a face-centred cubic structure, which retain good ductility at low temperatures.

The ductility of the metastable austenitic steels that have been previously subjected to plastic deformation is affected less by temperature than that of the annealed steels, since the amount of austenite transforming to ferrite in the tests at low temperature is less.

For the ferritic precipitation-hardening 18 : 8 steel, ductility decreases rapidly with decrease in temperature. At liquid-air temperature the steel is brittle. This 18 : 8 steel is similar therefore to the other ferritic steels, which lose ductility at low temperature and generally become brittle in tension tests at liquid-air temperatures.

Charging Open-Hearth Furnaces

The importance of quick charging of open-hearth furnaces was emphasised by Mr. W. A. Johnson in an address on "Scrap Preparation and Furnace Charging as Related to Cold Metal Open Hearth Shops" given to members of the West of Scotland Iron and Steel Institute at the annual general meeting recently.

Owing to present circumstances, it was not generally possible to carry out drastic alterations, said the speaker, and efforts should therefore be concentrated rather on accelerating present methods, than depending on enlargement of existing equipment.

At the meeting before the lecture, the accounts for 1947-48 session showed a deficit of £122. The council agree to an increase of subscription to 30s. for ordinary members and 15s. for associate members.

Titanium Prospects

Rival of Aluminium and Stainless Steel

THE prospect that titanium metal may become a powerful competitor with aluminium alloys and possibly with stainless steel is preoccupying metallurgists in the U.S.A., where active research is seeking to remove current technical difficulties, notably those associated with refining the metal. A Yale University metallurgy expert, Mr. Champion H. Mathewson, said last week that many metallurgical organisations were striving to discover practical ways of extracting titanium from its ore, the greatest difficulty yet encountered.

"The metal is steel-like in appearance and in strength," he said, "it does not corrode in air. Furthermore, its lightness gives it the highest strength-to-weight ratio of any competing metal and, with any luck at all in the alloy effort, this superiority will be greatly enhanced.

"The metallurgist cannot get the metal away from the oxygen in the mineral which constitutes the primary ore except by specialised operations at great expense. Indeed, the titanic strength of this combination is responsible for the name."

Reaction at High Temperatures

"If he uses simpler operations, other impurities that spoil the metal are unavoidably introduced. This metal, which is so resistant to contamination at atmospheric temperatures, is extremely reactive at high temperatures and, to make matters worse, it has a very high melting point, which interferes with easy casting."

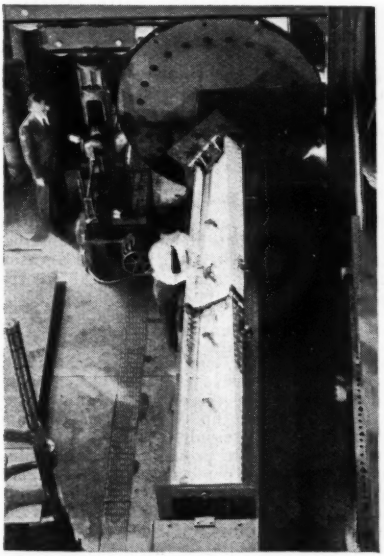
The Yale professor of metallurgy and metallography said that new mining and refining processes, when developed, would not bring titanium into competition with the vast quantities of steel used in buildings, bridges or ships. On the other hand, stainless steel, which might be its natural competitor, contained the expensive elements of nickel and chromium and presented its own difficulties of fabrication.

"We must think of these specialised or alloy-steel products as competitive from the point of view of cost with copper-base alloys such as the high-strength bronzes and not with the simplest forms of steel," he said.

If we are not confronted with war, he said, there was no danger of world supplies of copper, lead and zinc running out in the near future. Titanium and manganese, as well as aluminium and magnesium would "safeguard the future by offering a great abundance of very useful base metals, which would have great value as alloying additions to other base metals."

Torsion Testing

U.S. University Studies 4 ft. Specimen



This 2 ft. plate girder, to which Dr. Bruce Johnson, director of the laboratory (at rear) is applying torsion, is less than half the maximum size of steel members this machine can test

ONE of the world's largest pieces of equipment of its kind, a 2 million-lb. inch torsion testing machine, capable of accomodating specimens of 4 ft. 4 in. diameter and 16 ft. long, has been completed and proof tested at the Fritz Engineering Laboratory of the civil engineering department at Lehigh University, Pennsylvania, U.S.A. Designed to study the torsional behaviour of structural members such as plate and box girders, the machine can handle full-sized bridge sections, twisting them through any angle. It is approximately 9 ft. high and 25 ft. long, with a gross weight of 15 tons and a centre line 46 in. above floor-level.

It is expected that the new Lehigh testing unit will provide needed information concerning the torsional strength of riveted and welded built-up girders about which fundamental data is scanty. Torsional consideration is of particular importance in the critical period of initial erection of large engineering projects.

Surface Finishing of Aluminium—II

Anodising and Some Post-Anodic Treatments

by D. H. NAPIER, M.Sc., A.R.I.C., and J. V. WESTWOOD, M.Sc., F.R.I.C.

SULPHURIC acid anodising is the most recent type of treatment and has been developed largely in the U.S.A. as the Alumilite process. Concentrations of acid from 2 to 70 per cent have been used and numerous additions have also been made to the solution.[16]

In solutions of low concentration the films produced are hard and can attain thicknesses comparable with those obtained in oxalic acid. They are hard and abrasion resistant and will confer considerable corrosion resistance to the metal treated.

Clear Films

The films are clear and dye very well, so that an extensive range of clear colours is possible. Like the oxalic acid films, they will not stand up to deformation and "crazing" will result.

A typical bath providing suitable films is as follows: 7 per cent by weight of sulphuric acid is used at 20°C. and at a voltage of 20 will give films suitable for dyeing after 20 to 30 minutes treatment.[17]

Working in solutions of high concentration, the films produced are much thinner and highly absorptive.[18] In this way it is possible to produce films which are "ductile," *i.e.*, they will withstand considerable deformation without apparent rupture of the protective film. Articles can thus be anodically treated prior to pressing.

Owing to its versatility in providing a whole range of films, from those which are hard, thick and of low porosity, to those which are soft, thin and highly absorptive, sulphuric acid is largely replacing the other acids. There are, however, further advantages. The acid is cheap and the bath has a moderately long life. Power consumption is low, owing to the excellent conductivity of the electrolyte.

A Continuous Process

Probably the greatest asset, however, is that it can be used as a continuous process. This is due to the fact that apart from the original surge, the voltage remains very nearly constant throughout the process. In consequence, articles can be added or removed from the bath as required and are not confined to a fixed time-voltage cycle.

Additions have been made to sulphuric acid, including sugars, glycerine, etc.[19] They probably have little effect on the film, except by way of moderating the solvent action of the acid.

On the other hand they introduce other difficulties. In particular, the increased viscosity leads to greater "drag-out" and this is a danger from the point of view of subsequent corrosion due to retained acid.

Further, if such films are required for dyeing, "spotting out" difficulties, due to entrapped acid, are greatly increased.

Other acids, such as acetic, oxalic, etc., have also been added, but again their value is probably very slight.[20]

Before dyeing anodic films, great care must be taken to remove all the absorbed acid. While this is usually possible with wrought articles by thorough swilling with running water, it is not so reliable with castings, which are often somewhat porous.

Various methods of overcoming this difficulty have been suggested, but probably the best is thorough washing with dilute ammonia. Failure to remove the trapped acid results in "spotting out" in which portions of the surface are undyed. The metal articles are then immersed in the dye solution for a specified time at a given temperature to produce the required shade.

Alizarin Dyes

Many types of dye can be used, but those of the Alizarin type have marked advantages and are easiest to use. They are commonly operated in a weakly acid or buffered solution of low *p*H (4-6) and are very dilute.

Whole ranges of colours have been recommended by I.C.I., Ltd., *e.g.*, the Solway, Lissamine and Coomassie classes, many of which possess a high degree of heat and light fastness.[21]

After dyeing, the film is still porous, so that a sealing process is necessary to avoid absorption of grease, dirt or finger marks. This is accomplished in several ways, of which the following are the most important:

(a) a 5 per cent $K_2Cr_2O_7$ solution at 85°-90°C for 10 minutes.[22]

(b) a 1-2 per cent Na_2SiO_3 solution at 80°-90°C for 20 minutes.[23]

(c) A solution of a salt comprised of a weak acid and weak base buffered to a suitable *p*H, *e.g.*, cobalt acetate buffered with boric acid to *p*H 5.5. Such a solution at 80°C will effectively seal anodic films in five to 10 minutes.[24]

The latter type of solution does not affect

the colour and can consequently be used where pastel shades are required.

Probably the modes of action of sealing are different in the different solutions. In the latter type of solution it is not unlikely that hydrolysis of the metal salt with precipitation of metal hydroxide in the pores is the effective process. It is also possible that partial hydration of the oxide film occurs.

Anodic films are capable of absorbing materials other than dyes. If thoroughly dried the film is capable of absorbing oil. Use is made of this in the manufacture of pistons for IC and CI engines. These may be made from an aluminium alloy containing silicon such as Alpax. Such pistons after anodising in a suitable electrolyte and impregnation with oil then have a permanent oil film on their surface.[25]

Photographic Processes

Lettering or patterns can be produced on the anodic film by methods involving photographic processes. The Seo process, developed in Germany by the Siemens-Halske Co. is an example of this.[26] An anodic film is produced on sheet metal and after washing is impregnated with NH_4Cl. An immersion in $AgNO_3$ solution follows, in the absence of light, when a fine grained deposit of AgCl is produced. After drying, the metal sheet may be used as a photosensitive surface.

A negative is of course required, to obtain the image and subsequent sealing is necessary. The print obtained is very durable and is suitable for metal labels. It has in fact been used quite extensively for this purpose.

By anodic treatment in certain electrolytes under rather different conditions a brightening of the surface is brought about. The exact mechanism whereby this is effected is not clear,[27] but it appears that a levelling of the surface occurs, due to preferential attack of the high spots on the metal.

If pure aluminium is used and mechanically polished, a brilliant mirror finish may be obtained with a spectral reflectivity of > 80 per cent. As the purity of the aluminium falls below 99.5 per cent, the reflectance factor decreases very rapidly.[28]

Electrolytes used for this purpose may be divided into two classes (a) acidic; (b) alkaline.

(a) Acidic electrolytes consist of solutions of hydrofluosilicic or hydrofluoboric acids and form the basis of the Alzak process.[29] A solution of 2.5 per cent HBF_4 at 20-30°C is used at a voltage from 5-25 for periods of five minutes onwards.

(b) Alkaline electrolytes employ a solution of an alkaline salt. The Brytal process, developed by the British Aluminium Company, uses a solution of 15 per cent Na_2CO_3 and 5 per cent Na_3PO_4 at 80°C at 5-6 volts at 80°C for about 10 minutes.[30]

Both types of electrolyte have been used for aluminium reflectors, and surfaces can be produced with a specular reflectivity equal to that of rhodium plating.[28]

Sealing the Film

After anodic treatment, it is usual to dip the metal in a chromic phosphoric acid mixture (2 per cent CrO_3 + 3.5 per cent H_3PO_4)[31] to remove a "smudge" film which develops. A water wash follows and then a short anodic treatment in sulphuric acid to produce a protective film which reduces the reflectivity by less than 5 per cent. Finally this film is sealed.

The "electropolishing" rather than the "electro-brightening" aspect has been emphasised, since it is the more spectacular. However, the latter has the greater application. A whole range of household furnishings, such as tea trays and lampstands, and decorative articles has appeared on the market with a bright metal base rendered permanent by anodising and further embellished by dyeing in pastel shades of colour.

Here the metal is simply immersed for a specific time in a hot solution of alkali containing an oxidising agent in order to produce an oxide film on the surface. The Modified Bauer-Vogel (MBV) process consists simply of immersion in a solution consisting of 5 per cent Na_2CO_3 + 1.5 per cent K_2CrO_4 at 90-100°C for 5-15 minutes. An oxide film capable of absorbing dyes and also of sealing is produced.

Such films, however, are grayish in colour, due to absorbed chromate, so that only dark colours, *i.e.*, blues, browns, and blacks are suitable.

Bases for Paints

Sealing is usually done with 1-2 per cent sodium silicate solution.[32] The films are soft and have little abrasion resistance, so that little protection against wear is provided. However, they are excellent bases for paints, lacquers or varnishes, wherein lies their value.

This is a fairly recent development, but one with a future. Plating on aluminium is not easy, because oxide film is always present and causes adhesion of the deposit to be rather uncertain. This difficulty has, however, been overcome in two ways:—

(a) By simultaneous removal of the oxide film and deposition of a film of metal. For this, a strongly alkaline solution of a

(*Continued at foot of following page*)

Bright Aluminium Alloys

Means of Procuring Durable Finish

AN improved method of brightening aluminium alloy surfaces is claimed in an English patent application by Soc. de Prod. chim. des Terres Rares, Paris, with special reference to making the brightening more permanent and less affected by atmospheric tarnishing or other adverse action.

The surface is first thoroughly degreased, e.g., by electrolytic methods, then immersed in strong acid (pH below 1 and preferably below 0) solution of phosphoric and chromic acids and water, for 30-60 minutes, at a temperature of 80-90° C. This produces a uniform, satin-like surface, whether it has been previously polished or not, and serves to descale, removing any oxide without attacking the metal itself.

The surface is then subjected to anodic oxidation in alkaline solution containing ions of PO_4— and AlO_2—, prepared by dissolving trisodium phosphate and sodium aluminate in water, or aluminium phosphate and caustic soda, or in other ways. The pH should not be lower than about 11, and preferably about 12.

The part to be brightened is made the anode, temperature is 70-95° C., voltage 8-20 V., and current density 4-10 amp/dm.^{2} Time required is 5-10 minutes.

By this means a thin coating of aluminium hydroxide is deposited and is followed by rinsing with running water.

The film formed, at first in a powdery condition, is dissolved in a solution of phosphoric and chromic acids, similar to that used before. Colouring with organic dyes may be imparted, and surface finally sealed with boiling water or by other means.

(*Patent Application No.* 24344/1948; *conv. date* 29.4.47.)

SURFACE FINISHING OF ALUMINIUM—II

(*Continued from previous page*)

zincate containing a little copper salt is recommended by the Schering-Kahlbaum A.G.[33] and forms the basis of the Enthone process now used in the U.S.A.

The composition recommended contains 400 gms. NaOH, 80 gms. ZnO, 25 gms. Na_2SO_3 and 2 gms. of copper, in the form of cuprous cyanide, per litre. A period of immersion of 0.5 to five minutes is employed according to the alloy. After this treatment the article is immediately plated, usually with copper in an electrolyte of a *p*H which is not too high.

(b) By deliberately producing a porous anodic film which is capable of keying a metallic coating firmly to the surface. This is achieved by laying down an anodic film in an oxalic acid solution and then "modifying" the film in a dilute HF or KCN solution. The concentration time of treatment, etc., are all rather importantt and depend to a great extent on the type of alloy used. After modification, the metal is then directly plated with Ni, Cu, Cr, etc. This is the Krome-Alume process.[34]

The wide range of treatments possible will by now have become apparent. Indeed, aluminium, and its alloys are much more versatile in this respect than any other metal.

The choice of treatment depends upon convenience, cost and adaptability. Thus silicon alloys cannot be electro-brightened, and indeed any anodic treatment will only produce a dark brown or dark grey surface. Also assembled articles, especially if made from parts of different alloys or different metals, cannot usually be anodised as a whole.

There is little doubt that aluminium and its alloys will become even more widely used than at present. Its uses in industry have increased very rapidly during the war years and anodic treatment is being appreciated by the corrosion expert.

In the home, too, the number of aluminium articles has increased, due to the attractive finishes and the other advantages of light alloys. In conjunction with plastics, aluminium and its alloys seem certain to be a dominant factor in the environment of the future.

REFERENCES

16 M. Tosterud—U.S.P 1,900,472 ; Aluminium Colors Inc. B.P 406,988.
17 M. Tosterud—U.S.P 1,900,472.
18 Aluminium Colors Inc., B.P 378,521.
19 S. R. Sheppard, B.P 359,494.
20 Aluminium Colors Inc. B.P 409,679.
21 I.C.I. Booklet "Dyeing of Anodised Aluminium," 1940.
22 J. D. Edwards, U.S.P 1,946,152.
23 H. C. Hall, BP 566,306.
24 Aluminium Colors Inc., B.P 413,814.
25 *Metallwirtschaft*, 1932, *11*, 689-90.
26 Siemens Halske A.G.-B.P 407,830, B.P 418,498, B.P 442,902.
27 W. C. Elmore, *J. Applied Physics*, 1939, *10*, 724-7. 1940, *11*, 797-9.
28 N. D. Pullen, *J. Inst. of Metals*, 1936, *59*, 151-8.
29 Aluminum Co. of America, B.P 433,484.
30 N. D. Pullen, BP 449,162, B.P 513,530.
31 *Proc. Amer. Soc. Test. Mat.*, 1940, *40*, 955-66 ; B.P 489,161.
32 H. C. Hall, B.P 566,306.
33 J. Korplun, U.S. P 2,142,564.
34 Siemens Halske A.G -B.P 440,608.

Measuring Stress in Electrodeposits

Spiral Contractometer for Direct Reading

IN recent years there has been been a growing realisation of the importance of internal stress in the performance of electrodeposited coating and in the quality of plated articles. Excessive stress, usually the result of the chemical nature of the plating solution or of impurities in the deposit, may cause peeling, blistering or cracking of the coating and thus render the base metal more susceptible to corrosion.

The various methods devised for the determination of stress in electrodeposits have, in general, involved the measurement of the bending of a plated strip by means of a microscope comparator or some type of special gauge. Such methods, however, have lacked reliability or have been cumbersome for quality control in commercial production.

New Method

The U.S. National Bureau of Standards therefore undertook the development of a direct-reading instrument based on the twisting of a helix rather than the bending of an uncoiled strip. The result of this research was the spiral contractometer, which, because of its higher sensitivity, broader utility and greater ease of operation is expected to have extensive application in the investigation and control of electrochemical processes.

Essentially the new instrument consists of a flat metal strip wound in the form of a helix and mechanically connected to the pointer of a dial on which the rotation of the free end of the spiral with respect to its fixed end is indicated. The helix is connected at its upper, fixed end to a negative lead and suspended vertically in a plating solution with a suitable anode.

As it is plated with a sample coating, the stress in the deposit causes it to wind more tightly or to unwind, depending on whether the stress is compressive or tensile. A rod running down the axis of the helix is attached to its lower or free end so that rotation of this end due to stress is transmitted to the rod.

Measuring Stress

The rotation of the rod, in turn, is applied to a gear train which produces a $\times 10$ magnification in the rotation of the dial pointer. The angular displacement of the rod is read directly from the dial in degrees and converted to units of stress on the basis of the calibration of the helix used.

In making a stress determination, the helix is first cleaned and, when necessary for good adherence of the deposit to be tested, a "strike" plate is applied. After the helix has been dried and weighed, the inner side is brushed with thinned "stop-off" lacquer to prevent plating on this surface. The helix is then dipped in hot



Reading the angular displacement from the dial of the spiral contractometer. The degrees shown are converted to units of stress according to the calibration of the helix used

alkali and acid baths, or other preplating dips, and rinsed before it is mounted in the contractometer and immersed in the plating solution.

The helix may be allowed to twist as plating progresses, and a record kept of the displacements with time; or twisting may be prevented until the end of the run by clamping the pointer; both methods give the same results within the experimental error.

At the end of a run, the helix is taken out of the solution, cleaned, and dried, and the lacquer is removed from the inside with acetone. The deposit may then be stripped off as soon as it has been weighed to determine its average thickness. Stress is calculated from the observed deflection of the

(*Continued at foot of next page*)

Production and Stocks of Non-Ferrous Metals

THE following particulars of production, stocks, consumption, imports and exports of non-ferrous metals in the United Kingdom in March are extracted from the monthly figures supplied by the British Bureau of Non-Ferrous Metal Statistics.

UNWROUGHT COPPER

	Long Tons	
	Blister Copper	Refined Copper
OPENING STOCKS :		
Govt. and consumers'	25,755	79,377
Imports into U.K.	14,014	12,532
PRODUCTION :		
Primary	—	9,246
Secondary	2,400	7,222
CONSUMPTION :		
Primary	9,307	32,634
Secondary	—	15,734
EXPORTS FROM U.K.	2,876	41
CLOSING STOCKS :		
Govt. and consumers'	29,112	70,274

GROSS OUTPUT OF MAIN COPPER ALLOY AND PRODUCTS

Unalloyed copper products	29,850 long tons
Alloyed copper products	25,560 ,, ,,
Copper sulphate	5,884 ,, ,,

UNWROUGHT ZINC

	Long Tons	
	Zinc in Concentrates (estimated gross Zinc content)	Slab Zinc (all grades)
OPENING STOCKS :		
Govt. and consumers'	13,011	39,805
Imports	9,640	15,807
PRODUCTION :		
Virgin and remelted	—	6,260
CONSUMPTION :		
Virgin (incl. debased)	7,726	19,585
Remelted and scarp	—	7,119
EXPORTS	—	72
CLOSING STOCKS :		
Govt. and consumers'	14,925	41,570

LEAD

	Long Tons			
	Lead in Concentrates	Imported Virgin Lead	English Refined	Lead Content of secondary scrap and Residues
OPENING STOCKS :				
Govt. and consumers' ...	—	18,603	2,683	—
IMPORTS		15,141	—	73
PRODUCTION ...	158	—	4,810	
CONSUMPTION ...	158	12,844	5,662	10,179
EXPORTS	—	50	—	—
CLOSING STOCKS :				
Govt. and consumers' ...	—	21,842	1,831	—

TIN METAL

	Long Tons
GOVT. AND CONSUMERS' STOCKS AT END OF PERIOD	13,201
IMPORTS	53
PRODUCTION	1,280
CONSUMPTION	2,020
EXPORTS AND RE-EXPORTS	438

ANTIMONY

	Long Tons
TOTAL CONSUMPTION OF ANTIMONY METAL AND COMPOUNDS	317
TOTAL CONSUMPTION OF ANTIMONY IN SCRAP	167

CADMIUM

TOTAL CONSUMPTION OF CADMIUM ...	44.15

MEASURING STRESS IN ELECTRODEPOSITS

(*Continued from previous page*)

pointer, the physical constants and dimensions of the helix, and the average thickness of the coating.

A single helix can be used almost indefinitely without appreciable change in its dimensions, elastic moduli, or deflection constants, provided reasonable precautions are taken in handling and storing. Between successive runs only the helix and the clamps which hold it are removed, leaving the rest of the assembly intact. During periods of disuse the instrument need not be completely dismantled except for occasional cleaning. When this is necessary, both dismantling and re-assembling can be accomplished in less than five minutes.

The helix is made by winding a metal strip of uniform width and thickness on a $\frac{3}{4}$-in. steel rod in such a way as to avoid spaces or overlaps between the coils. The width of the strip is about 0.7 in.; its thickness is usually between 0.01 and 0.03 in., depending on the rigidity required for the particular application.

For deposits under very high stress, thicker strips may be used. When the winding is completed, the ends are anchored to the rod with screws. The helix is then annealed in a vacuum in order to relieve the stresses due to cold working and thus prevent uncoiling. After annealing the rod is mounted in a lathe, and the helix is cut off at the desired length and stretched lengthwise until the coils are separated from each other by a distance of about 0.02 to 0.04 in. Upon removal of the inside rod it is ready for use.

Stress determinations made with the spiral contractometer on nickel deposits are reproducible to within plus or minus 10 per cent. Values obtained with the device are in close agreement with reported values and with measurements made by procedures based on other principles.

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Overseas News Items

New Italian Plant.—The Nobel Society has installed a new plant in Pescara, Italy, which will produce calcium carbide, caustic soda and chlorides.

Phosphate Concession.—The Transjordan Government has granted to an Italian company a concesssion for the exploitation of phosphate seams. The difficulty of transport to the coast represents an impediment to full development.

Australian Project.—Plans to spend £350,000 on plant and buildings in Australia are to be put in hand during the current year by the Lewis Berger group. Mr. W. J. Darby, managing director of the group, left London by air recently to visit the Berger factories in the Commonwealth.

U.S. Equipment for French Aluminium.—Electrical transformer equipment, valued at about $300 million, has recently arrived at Marseilles from a dismantled Los Angeles plant. It is to be delivered to the Péchiney group and is expected to increase aluminium output by 20,000 tons to approximately 85,000 tons a year.

Chemicals from Oil in France.—The Naptachemie, a French research company in which the Société Générale des Huiles de Pétrole, the Etablissements Kuhlmann and the Péchiney group are interested, has recently been transformed into an operating company which is to engage in the manufacture of oil-based chemical products.

Improved French Steel Production.—For the first time the output of steel in France has exceeded the 1939 monthly average of 909,000 tons. Production in March was 927,000 tons, an increase of 107,000 tons over the previous month. Cast iron output for March was 752,000 tons compared with 663,000 tons in February.

Another "TVA"?—President Truman has asked the U.S. Congress to set up in the U.S. Pacific Northwest area a natural resources programme similar to the spectacularly successful Tennessee Valley Authority. He is asking for the consolidation of existing Federal activities in the states of Oregon, Washington, Idaho and Montana into a single agency called the Columbia Valley Administration. The development would make full use of the waters of the Columbia River system, second only to the Mississippi in the volume of flow, thought to be capable of producing more than ten times as much electric power as they do now.

French Cement Record.—New high level production figures were reached in March by the cement industry in France with a total of 560,000 tons, as against a monthly average of 448,319 tons in 1948.

35,000 Gallons in Glass.—The Pfaudler Company, Rochester, N.Y., claims a new record by manufacturing one-piece glass-lined chemical storage tanks in sizes increased up to 35,000 gal. capacity. New engineering and ceramic problems were solved to provide them.

Venezuela Oil Total.—Production of crude oil in Venezuela during 1948 is recorded to have been 77.9 million cu. m. compared with 69.15 millions in 1947. Exports of crude oil last year increased to 69.5 million cu. m. from 63.15 millions, while shipments of petroleum derivatives amounted to 4.96 million cu. m. against 4.3 millions in 1947.

Larger Aluminium Stocks.—American production of primary aluminium in January totalled 53,356 short tons, approximately the same as December output. Month-end stocks of primary aluminium at reduction plants increased 31 per cent to 17,310, the largest quantity reported since November, 1947.

Propionaldehyde.—The Celanese Corporation of America is now offering propionaldehyde in bulk quantities. It has formerly been produced only on a pilot plant scale. Propionaldehyde has properties approximating to those of both acetaldehyde and butyraldehyde and has the highly reactive characteristics of the aldehyde group.

International Leather Chemists. — The American Leather Chemists' Association has accepted the invitation of the International Union of Leather Chemists' Societies to become a member. The American organisation is now appointing delegates to represent it at the International Conference of Leather Chemists, which will be held in Paris in September this year.

Turkish Copper Projects.—Materials for the construction of a concentrating plant are reported to have arrived at the Ergani copper mines. When in full operation, it is expected that 3000 tons p.a. will be produced. It is also noted that a mill and smelter are being installed at Murgul in North-Eastern Turkey, to be completed in 1950, with an annual capacity of about 12,000 tons of blister copper.

Personal

MR. A. L. BACHARACH has been appointed chairman of the Food Group of the Society of Chemical Industry for the year 1949-50. Mr. Bacharach has been associated with the Food Group since its beginning in 1931; first as an elected member of the committee then as an *ex officio* member for seven years by virtue of being honorary secretary of the group's Nutrition Panel and for a further four years as its chairman; and last year again elected to the committee.

SIR GRAHAM CUNNINGHAM, chairman and managing director of the Triplex Safety Glass Co., Ltd., has been appointed head of a department representing British industry which will work with the Board of Trade to increase exports to Canada and the U.S.A. Sir Graham points out that this appointment will not affect his duties at Triplex or elsewhere.

MR. LESLIE O'CONNOR, who has been loaned to the Ministry of Fuel and Power for the past nine years as director of coke, has resigned his position to give more time to his duties as director of carbonisation of the National Coal Board.

MR. EDWARD WILLIAM MATHIS, assistant to Dunlop's overseas sales manager, has left England to become their resident representative in Burma. Before taking up his new post he will spend a month or two in Siam.

The South African scientist, DR. ROBERT BROOM, last week received the Wollaston Medal at the Geological Society's annual meeting in London for his researches in vertebrate palaeontology.



Mr. F. E. Lowe, works manager of United Ebonite and Lorival, Ltd., who is visiting the U.S.A. to study the American plastics and ebonite industry

Obituary



Sir Robert Robertson

SIR ROBERT ROBERTSON, K.B.E., F.R.S., died in London at the age of 80. Sir Robert was well-known for his investigations on the chemistry of explosives as well as devising new methods of making them. Born at Cupar in 1869, he was educated at the University of St Andrews. In 1907 he was appointed to the Woolwich Research Department where under his direction a modification of the composition of cordite (RDB) was worked out and his experiments led to a new process for the manufacture of TNT. Leaving Woolwich in 1921, Sir Robert became Government Chemist, which post he held until 1936. The following year he became director of the Salters' Institute of Industrial Chemistry. In 1939 he returned to Woolwich Arsenal where he remained as head of the Armament Research Department until 1946. Sir Robert was elected a Fellow of the Royal Society in 1917, being awarded its Davy Medal in 1944. He was president of the Faraday Society in 1923-24 and of the chemistry section of the British Association in 1924. Besides his work on explosives Sir Robert investigated the spectroscopy of the infra-red region of the spectrum and the internal structure of the diamond.

PROFESSOR F. S. KIPPING, pioneer of research work in organic chemistry, died at his home at Criccieth, North Wales, aged 86. Professor Kipping was educated at Manchester Grammar School, at Caen, and in the University of Munich. He was appointed to the chair of chemistry at University College, Nottingham, in 1897, where he remained until his retirement in 1936. His investigations in organic chemistry led to his election to the Royal Society at the early age of 34.

Technical Publications

ONE of the ealiest known examples of the use of copper piping is a pipe found in Egypt made from lapped strip which had been laid in a rock trench and covered with gypsum. It is considered to be nearly 5000 years old. It is during the last 20 years, however, that rapid progress has been made in developing the use of copper tubes for underground supplies. Experience and tests over long periods in the United Kingdom, Australia and the U.S.A., have proved the superiority of copper over other metals against soil corrosion. In the soft state copper piping has a tensile strength of at least 12.5 tons per sq. in., with a minimum elongation of 40 per cent on 2 in. Being thus made of a strong and ductile material copper pipes will adapt themselves to soil settlement, while tests have shown them to be unimpaired by considerable vibration, even over a long period of time. These are among the basic characteristics of copper tubing to which attention is called in one of the recent publications of the Metals Division, I.C.I., Ltd., relating to its Kuterlon tubing, employing special copper (B.S. 1172 or 1174). The fact that it can be supplied in lengths up to 30-60 ft., greatly recommends its use for large-scale work, as at Ashton Court, Bristol, where 9000 ft. are being used to pipe water for this year's Bath and West Show.

* * *

The Spring issue of *Progress*, house journal of Lever Brothers & Unilever, Ltd., contains something of interest to almost every branch of industry. An article on the place of industry in relation to the Town and Country Planning Act emphasises the need for mutual understanding between the planner and the industrialist. Another article discusses the trend towards a new conception of human relationship in industry in promoting greater productivity. The role of flower oils in the manufacture of soaps, detergents, cosmetics, etc., is also discussed in an informative and interesting manner. *Progress* is, as usual, profusely illustrated.

* * *

Several fine chemicals only recently available in Britain are included in the new lists of fine chemicals for research and industry just issued by British Chemicals and Biologicals, Ltd. Prices quoted are for smaller standard packings, but in most cases material may be obtained in bulk quantities. Non-listed chemicals may also be obtained if within the company's general development programme.



Liberal use of stainless steel in the working head is one of the merits, affording easy maintenance and improved durability, of this new design in granulators (J. G. Jackson and Crockatt, Ltd.)

Publication in a single pamphlet of a series of papers on the subject "What Good Are Standards?" is announced by the American Standards Association. The papers discuss, among other topics, the functions of standardisation in commercial operations such as purchasing, manufacturing, and marketing, and its value to wholesalers and retailers.

* * *

The importance of an international understanding of scientific matters is reflected in the announcement by the Internacia Scienca Asocio Esperantista of the issue of a new periodical in Esperanto entitled *Scienca Revuo*, which will appear quarterly. In the first issue, comprising 40 pages, each article is given the appropriate decimal classification numbering used in international abstracting, and one section is devoted to an explanation of this system.

* * *

In its new model (TS.8) designed for general purposes, Sunvic Controls, Ltd., has made a useful addition to its varying types of thermostats. It has an adjustable range of 250° C. without re-setting, the scale being clearly marked in angular divisions. Uses include oil and water baths, drying rooms and other laboratory purposes.

Canadian Steel

Cost of Electric Smelting

IN a report dealing with the cost of smelting and a steel plant to make use of Ungava's iron ore deposits, prepared by Prof. Gerard Letendre, director of the department of mining and metallurgy at Laval University, submitted to the Quebec government, it is pointed out that to handle 10 million tons of ore a year an expenditure of $1.4 million would be necessary. Electric smelting would add another $300 million to the total.

Private Enterprise

The Quebec Government has decided that for the present it would be more practical for private enterprise, partly backed by United States capital, to bear the cost of opening Ungava mines and export the ore across the border for manufacture.

Prof. Letendre points out that smelting of 10 million tons of ore annually would require 172 electric furnaces with daily pig iron output of 100 tons each. The cost of such furnaces would be about $2 million each.

Production of 6 million tons of pig iron from 10 million tons of iron ore would take a 2 million h.p. installation and the cost would be $350 million.

The report says that " if a complete steel works, including furnaces, rolling mills and other equipment were added to the blast furnaces to give a complete integrated iron and steel plant, the total cost would be roughly $1 million." The Professor expressed the opinion that over the years " a few small profitable electric smelters could perhaps be built here and there " in Quebec, depending on what district have power surpluses.

" From a technical standpoint there would be no overwhelming difficulty to producing by one method or another 5 million tons or more of steel in the province as soon as mining operations start in New Quebec. However the products of the steel works would have to be sold, and nobody has yet explained how and where such a quantity of steel could be disposed of in the next few years. It would be desirable to have an important iron and steel industry in the province, but it is essential that a much more detailed investigation be carried out if an appropriate conclusion is to be reached," the report says.

NEXT WEEK'S EVENTS

MONDAY, MAY 9

British Industries Fair. London: Olympia and Earls Court. Birmingham: Castle Bromwich (until May 13).

TUESDAY, MAY 10

Society of Chemical Industry (Chemical Engineering Group). London: Burlington House, Piccadilly, W.1, 5.30 p.m. W. Barr and J. Erskine: " The Manufacture and Use of Stainless-clad Steel."

Society of Instrument Technology. Manchester: College of Technology, 7.30 p.m. Annual general meeting, followed by film: " Atom Physics."

WEDNESDAY, MAY 11

British Association of Chemists. Birmingham: University, Edmund Street, 6.30 p.m. W. Morley Davies: " Trace Elements in Agriculture."

Institute of Fuel. Manchester: Engineers' Club, 11-1 p.m. and 2-4 p.m. Conference: " Combined Heat and Power Supplies."

The Royal Institution. London: 21 Albemarle Street, W.1., 9.0 p.m. Prof. E. K. Rideal: " How Crystals Grow."

THURSDAY, MAY 12

The Chemical Society. London: The Royal Institution, Albemarle Street, W.1. 7.15 p.m. Dr. E. Lederer (*Institut de Biologie Physico-Chimique, Paris*): " The Chemistry and Biochemistry of Some Mammalian Secretions and Excretions." Hull: University College, 6.0 p.m. Joint meeting with University College Scientific Society. Prof. A. R. Todd: " The Mechanism of Drug Action."

The Royal Society. London: Burlington House, W.1, 4.30 p.m. Bakerian Lecture for 1949 by Prof. H. Raistrick.

FRIDAY, MAY 13

Institution of Chemical Engineers (Graduates' and Students' Section). London: University College, Gower Street, W.C., 6.0 p.m. Business meeting, followed by annual dinner.

The Chemical Society. Newcastle-on-Tyne: King's College, 5.0 p.m. Bedson Club Lecture, Sir Cyril Hinshelwood.

National Industrial Safety Conference. Scarborough (until May 15). Speakers include: Sir Geoffrey King and Sir Charles Bartlett

Home News Items

Rough Copper Price Down.—The Ministry of Supply announced that the buying price for rough copper 97.25 per cent minimum was reduced by £15 per ton to £90 per ton ex makers' works for delivery by the end of the third month forward. For rough copper running 99 per cent and over, there is an extra £1 10s. per ton.

Vibration Equipment.—A new department mainly technical in character to give advice on the most efficient use of vibration equipment for diagnosis and measurement purposes is being formed by Mullard Electronic Products, Ltd., at their Aboyne Road Works, Tooting, S.W.17. Marketing of vibration apparatus which includes, by agreement, specialised equipment developed by de Havilland Propellers, Ltd., will also be conducted through this department.

Private Buying of Straw.—It has been announced by the Board of Trade that straw for paper-making after the end of June will no longer be purchased on public account by the Paper Control for re-sale to paper and board mills. The Paper Makers' Straw Trading Company will, however, remain in being for three months from July 1 to advise and help paper makers in maintaining regular supplies of straw.

British Plastics for Sweden.—The 14th annual luncheon of the British Plastics Federation was held in London last week. Mr H. Nystrom, president of the Swedish Plastics Federation, in his speech said that Sweden was last year the biggest importer of British raw materials for the plastics industry. Mr. C. F. Merriam, chairman of the British Plastics Federation said that the industry was increasing its output capacity and that they were confident the demand for plastic materials would continue to grow.

Glucodin Price Increase.—Glaxo Laboratories, Ltd., Greenford, Middlesex, announce that price of Glucodin was increased as from May 2. Face prices to the public are now: 2s. 6d. per 1 lb. tin and 6s. 9d. per 2 lb. tin. Standard trade discount remains unchanged at 25 per cent. Cost to the trade of No. 11 parcel (2 doz. × 1 lb. tins) is now £2 nett and No. 12 parcel, when available (1 doz. × 3 lb. tins) £2 14s. nett. Glucodin supplies are still restricted, and it may be necessary on occasions to reduce orders to meet the supply position. Glucodin parcels are no longer sent automatically, and should be ordered from the head office at Greenford.

Record Cycle Exports.—An increase in the number of cycles and motor cycles exported in March, resulted in establishing a new record for the first quarter of 1949. Total value of machines and components exported was £7,841,450 compared with £6,087,387 for the same period last year. Main increases went to India, Canada, and Australia.

Coal Output.—Coal production rose last week after the decline due to the Easter holidays. Figures issued by the Ministry of Fuel were 4,362,600 tons compared with 4,224,200 tons for the corresponding week last year. The total output for the first 17 weeks of this year was 71,243,900 tons an increase of 1.86 million tons over the same period of 1948.

Alleged Pollution From Oil Tankers.—Allegations that oil tankers entering Heysham harbour to unload were responsible for pollution of the waters in Morecambe Bay, were made last week at a meeting of the Preesall (Lancs.) council. The chairman of the health committee said that the matter had been taken up with the responsible authorities and assurances had been given that the tankers would not clean out their bilges within 250 miles of the coast.

Licences for New Soap Manufacturers.—It is announced by the Minister of Food that as from May 22 soap-making licences will be granted to intending manufacturers who are in possession of the necessary plant and facilities. Applications should be made to the Ministry of Food, Oils and Fats Division, London Road, Stanmore, Middlesex. From the same date a 10 per cent increase in their four-week allowances will be granted to manufacturers of unrationed soap products who obtain supplies of soap base by means of a Permit Soap 2A on application to their local Food Offices.

Tuberculosis Conference in London.—The second Commonwealth and Empire Health and Tuberculosis Conference will be held in London at Central Hall, Westminster, from July 5 to 8, under the patronage of the Duchess of Kent, President of the National Association for the Prevention of Tuberculosis. Seventeen British Dominions and Colonies will be represented, as well as visitors from many foreign countries, including America, Austria, Czechoslovakia, France, Greece Holland, Italy, Norway, Poland, Spain, Sweden and Switzerland.

American Chemical Notebook

(From Our New York Correspondent)

THE Schering Corporation, the large-scale producers of well-known pharmaceutical products at Bloomfield, New Jersey, is to be offered for sale approximately at mid-summer. This is the effect of an announcement by the Office of Alien Property, following the dismissal by a Federal District Court of the suit of the Swiss Bank Corporation to prove that Schering was its property and was not German-owned. It was seized as an enemy undertaking in April, 1942, and has operated under State control ever since. The large reorientation in the control of chemical resources which this represents is parallel with the current action by the U.S. Government against the Swiss I.G. Chemie to secure a ruling that the Government's seizure of the $100 million General Aniline and Film Corporation—in 1942, on the ground that it was enemy property—was justified. None of the General Aniline undertakings in the U.S.A. can be disposed of pending the court decision, which may turn on the outcome of current attempts to establish that I.G. Chemie was closely identified with I.G. Farbenindustrie. The complications of that suit may take up to two years to resolve.

* * *

A new phenolic moulding compound, which can be moulded at one-third the pressure normally required for compression moulding, is claimed to have resulted from a formulation by the Durez Plastic and Chemicals Company, Inc., North Tonawanda, New York. The new formula, Durex 13527, is a general-purpose type, with its physical properties claimed to be superior to the general-purpose compounds and good face finish. The new compound may enable moulders to use their present press capacity for much larger pieces.

* * *

With production now under way at its Port Adams, Texas, plant on the Houston Ship Canal, more than 200,000 tons of ammonium sulphate fertiliser will be produced yearly by the Phillips Chemical Company, a subsidiary of the Phillips Petroleum Company. Port Adams is one of the largest plants in the U.S.A. producing synthetic ammonium sulphate by reacting sulphuric acid with anhydrous ammonia gas. Four hundred tons of sulphuric acid are used daily.

A combination of U.S. and Chilean inte[r]ests, represented by the Bethlehem Chil[e] Iron Mines, a subsidiary of the Bethleh[em] Steel Corporation, and the Compania [de] Acero del Pacifico (Pacific Steel Compan[y] has just concluded a contract to secur[e] development of the Chilean steel indust[ry] under the terms of which Bethlehem wi[ll] supply the Chilean company with iron or[e] at cost for 20 years. Involving a tota[l] investment of $9 million, of which Bethl[e]hem will supply $6.5 million and Pacifi[co] the remainder, the contract proposes th[e] exploitation of Bethlehem's rich El Romer[al] iron deposits in La Serena Department, t[o] begin within three years. In the first yea[r] it is expected 1 million tons will be mined, of which Pacifico will get 350,000 tons. Th[e] balance will be exported.

* * *

Hydrazine in anhydrous form and smal[l] quantities of hydrazine sulphate are no[w] being produced by the Mathieson Chemica[l] Corporation. Production has been started with the collaboration of the U.S. Arm[y] Ordnance Department, but limited amount[s] of the products are also being supplied t[o] commercial interests for test purposes. Many potentially valuable commercial use[s] are being investigated and patents already issued suggest that the products may find application in the manufacture of insecti[-] cides, bactericides, and plastics, and i[n] textile processing. Since hydrazine is als[o] of value in chemical laboratories as an analytical reagent and in the production of organic intermediates, it is probable that similar uses on a commercial scale will be developed as the compound increases in availability.

* * *

Secondary tin recovered by U.S. de[-] tinning plants, as metal and in chemical compounds increased 6 per cent in 1948, according to the U.S. Bureau of Mines. It reports that recovery of tin from tin-plate clippings and old cans was 3667 short tons in 1948, compared with 3774 tons in 1947. The tonnage of tin-plate clippings treated in 1948, 376,620 longs tons, was the largest on record, 17 per cent more than in 1947. The average quantity of tin recovered per long ton of scrap declined from 220.6 lb. in 1947 to 18.91 lb. in 1948. The lower recovery per unit reflects the treatment of a larger tonnage of electrolytic tin-plate carrying a much thinner coating of tin than hot-dipped tin-plate.



A CHEMIST'S BOOKSHELF

An Introduction to Organic Chemistry. Ira D. Garard, Ph.D. Chapman and Hall, London. Third Edition. Pp. 396. $3.50.

The author, Profesor of Chemistry in the New Jersey College for Women, Rutgers University, has attempted to present in this volume such fundamental organic chemistry as may be required for a student's fundamental training. Quoting from the preface to the first edition the author says " It is felt that a rather thorough study of a small field is preferable to a scant treatment of all the topics introduced into a course that extends throughout a year. Accordingly, many reactions of great importance in organic synthesis have been omitted entirely. Among them are the Grignard reaction, the acetoacetic ester synthesis and many that are found in the aromatic field." Admittedly a book of an elementary nature has to be kept within fairly well defined limits of size, and consequently the most difficult problem is always to know what to leave out rather than what to put in. With respect to the aliphatic section of the book the policy of dealing fully with a selected field has been followed very well indeed and much useful information is clearly presented.

It is disappointing to find in the chapters dealing with the aromatic compounds that the encouraging beginning is not maintained. Here the facts are so condensed that in some cases so little information is presented that one feels that the section might have been omitted completely without any loss. There is always the tendency in any scheme of simplification to introduce errors at the price of brevity and to say (p. 297) that nitric acid reacts with aniline to substitute the hydrogen atoms in the ortho and para positions is a bad mistake. Such a factual compression, apart from being wrong, completely overlooks the similarity in reactivity between amines and phenols due to the activating influence of the substituents in the aromatic ring. Surely in any elementary course the prime aim should be to accentuate such similarities between the various groups and develop the theme in a general way. The learning of further factual information will proceed more easily once these principles have been grasped. It would be unfair to be too critical of the choice of subject matter in the book since the type of course for which it is designed is not known, but, if the publishers are desirous of sales in this country, then it should follow fairly closely the system at present in operation at most universities and colleges in Great Britain.

Broadly speaking this requires that in the first year a student learns the important reactions of the several functional groups and that the rest of his course is spent applying such reactions to more advanced branches, such as natural products. Since in these fields the use of Grignard reagents and aceto acetic ester syntheses are everyday occurrences it would seem very much better to include such important synthetic methods early on in a student's course, and to omit from a book of this size and type, a chapter such as the one on hetereocyclics where one cannot hope to deal adequately with nine ring systems in ten pages. There are several indications that the material in this volume has been revised from the previous edition and the most noticeable additions are in the sections dealing with aliphatic hydrocarbons and nitro compounds. As an elementary book on aliphatic chemistry this book is good, but the remainder suffers from being rather over condensed, though it must be stated that throughout the material is presented in an exceptionally clear and logical way.

The Earliest Chemical Industry. Dr. Charles Singer. 1949. London: The Folio Society. Pp. xviii, 337; 10 guineas.

First impressions conveyed by this " Essay on the Historical Relations of Economics and Technology Illustrated from the Alum Trade " are of the kind which might be expected to consume the traveller in the desert stumbling upon a well-stocked vineyard. Here the first and foremost is a return to book publishing in the grand and opulent manner which long experience of austerity editions and important works in paper covers had persuaded us to regard as a thing of the past. Like many other sublime conceptions, this richly decorated and scholarly study of what was probably the first pure chemical material is intended to serve *inter alia* as a commemoration of the completion by Peter Spence & Sons in 1946 of its centenary and as a lasting

memorial to Peter Spence whose pioneer work in the production and treatment of alum for industry was among the decisive forces helping to form the great industrial structure of the country since Victorian times. The book appropriately recalls the devoted workmanship which produced the missals in " the age of faith " and its extraordinarily ample conception, to survey all significant evidence of the use of alum and its influence on human affairs in the course of some 4000 years—has been made possible by the collaboration with the author of a great number of authoritative contributors, to whom Dr. Singer gives full acknowledgment. The inspiration for the book derived from Mr. Derek Spence, managing director of Peter Spence & Sons and great grandson of the founder, who in a preface points to the long exclusion of chemical materials for the range of subjects thought worthy of full-length study from the historical standpoint. The decision to upset that tradition has produced extraordinary results, in the evidence that at least one chemical substance, besides salt, has been the intimate preoccupation of a host of lives from the earliest recorded civilisation in Mesopotamia. It had a " literature " in cuneiform signs and hieroglyphics, with addenda in nearly every tongue of all ages thereafter, and for centuries was invested with an economic and political importance which might be compared in a somewhat different context with uranium in the present. All these facets of the story of alum and many of the records in which they are enshrined are richly presented and documented. The frequent presentation (in place of structural formulae, flowsheets or diagrams of the ordinary chemical study) of richly coloured plates of the art of the periods endows the volume with all the qualities of a collector's piece for artists and historians, as well as the chemists, dyers and others, whose predecessors' story is here brought to life.

Barium Sulphate in Argentina

Extraction and refining of barium sulphate in Argentina has been declared an industry of national interest. In order to give the industry every chance of development, this status will be maintained for three years and quotas will be imposed on the imported product. At present, barium sulphate, used in Argentina in the tanning industry, is produced by only three firms. An attempt is also being made by the Government to encourage the growth of pyrethrum. The seed and instructions are offered free. Argentina's present requirements of this insecticide material are mainly met by imports.

Vermiculite in Mysore

Evaluation of Widespread Deposits

THE Geological Department of the Government of Mysore, South India, has undertaken intensive regional prospecting work to estimate the extent and quality of vermiculite deposits, the existence of which was proved recently.

The mineral was first noticed in the Tumkur district and a further investigation had revealed that it occurs in bulk at Malavanghatta, in Chennarayapatna Taluq, Bagespura and Nandihalli, in Arsikere Taluq, and Chunchinkatte in Krishnarajanagar Taluq.

Vermiculite being extensively used in the construction of sound-proof and fire-proof buildings, has the property of exfoliating when heated and expanding about 15 times its original volume.

Such expanded vermiculite weighs only about 8 lb. per cu. ft. (sand or clay would weigh nearly 90 lb.). The uses of vermiculite are based mainly on its being comparatively refractory with low conductivity for heat and sound.

Exfoliated vermiculite is used either as a loose filling, moulded into slabs, cemented into flexible sheets or applied as a plastic mass. When combined with suitable bonding materials, vermiculite is fabricated into pipe-covering insulating blocks, plasters, tiles and structural roof-slabs. As a light-weight aggregate in concrete, vermiculite has been largely employed for cast slabs used in the construction of prefabricated houses.

As a substitute for rock-wool and glass-wool it has increasing application for insulating buildings, ovens, furnaces and refrigerators. The heated material takes on brilliant silvery or golden sub-metallic lustres, which gives the powder form considerable decorative value.

Acid-Resisting Boot

A new rubber boot with enhanced resistance to acids has been designed at the Dunlop Rubber Company's rubber boot works in Manchester, intended for use of workers in chemical plants, electro-plating plants, and elsewhere. A specially compounded rubber has been used to give the maximum resistance to acid attack. Hitherto, the weakness of acid-resisting boots has been at the seams where the acid lodges and tends to build up in concentration; this weakness is overcome in the new boot by reversing the seams. The boot has been successfully tested in the laboratory with all mineral acids at a high concentration, except, of course, nitric acid.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

B. C. R. FACTORIES, LTD., Welwyn Garden City. (M., 7/5/49.) March 22, charge, to Barclays Bank, Ltd., securing all moneys due or to become due to the bank; charged on factory and land Bridge Street, East Welwyn Garden City. *Nil. December 29, 1948.

HELMER PRODUCTS, LTD., London, E. (M., 7/5/49.) March 21, £300 debenture, to J. Wears, London; general charge.

SAMUEL WARD & CO., LTD., Slough. (M., 7/5/49.) March 21, £2500 debentures; general charge. *£10,000. March 29, 1948.

SEPTISOL, LTD., Manchester. (M., 7/5/49.) March 18, £4500 debenture, to Branch Nominees, Ltd.; general charge. *Nil. December 30, 1948.

Satisfactions

METAL PRODUCTS (TREFOREST), LTD., Caerphilly. (M.S., 7/5/49.) Satisfaction, March 24, of mortgage registered June 19, 1947.

MIDLAND TAR DISTILLERS, LTD., Birmingham. (M.S., 7/5/49.) Satisfactions, March 23, of debenture registered March 13, and two collateral charges registered March 27, 1924, and debenture registered July 28, 1939.

New Companies Registered

Abrasive Rubbing Machines, Ltd. (467,180). Private company. Capital £5000. Manufacturers of abrasives, chemicals, bonding, abrasive sanding, etc. Directors: W. A. Horswill, J. C. Sherrott. Reg. office: 87 Regent Street, W.1.

Blyborough Machinery & Drying Co., Ltd. (467,452). Private company. Capital £300. Chemical sprayers, etc. Directors: H. Dickinson, J. I. C. Dickinson, P. H. Dickinson. Reg. office: Blyborough Hall, Gainsborough, Lincs.

Ian Dexter, Ltd. (467,655). Private company. Capital £100. Manufacturers of chemicals, gases, oils, isinglass, etc. Reg. office: 17 Clifford Street, W.1.

Horsfield Brothers, Ltd. (467,653). Private company. Capital £10,000. Objects: To acquire the business of chemical manufacturers, carried on as the Standard Chemical Company. Directors: J. Horsfield, J. A. Horsfield. Reg. office: Cheadle Works, Mill Lane, Cheadle, Ches.

J. W. Jones (Chemists), Ltd. (467,750). Private company. Capital £2000. Manufacturing and general chemists, etc. Directors: J. W. Jones, F. W. King, C. D. King. Reg. office: 42 Astwood Road, Worcester.

Morganite Exports, Ltd. (467,665). Capital £5000. Manufacturers of refractory, chemical and abrasive ware, foundry requisites, etc. Reg. office: Battersea Church Road, S.W.11.

Société Anonyme D'Innovations Chimiques "Sinnova." (F3978). Capital 72.6 m. francs. Registered in France on March 10, 1948, to manufacture organic salts, etc. British address: 18-20 Jermyn Street, S.W.1. Directors: R. Nomani, Y. Blinoff, S. de Giers, S. Alexceff and M. Pamard; all of France.

Company News

The following increases in registered capital are announced: **Shell Company of Pakistan, Ltd.,** from £100 to £200,000; **F. W. Berk & Co., Ltd.,** from £100,000 to £300,000 (and made a "public" company); **Actid, Ltd.,** from £2500 to £10,000

Chemical and Allied Stocks and Shares

HOPES of early lifting of the Berlin blockade helped sentiment in stock markets and values in most sections moved in favour of holders, although generally the volume of business was only moderate. Terms of the 3 per cent British Gas stock were regarded favourably in the market, and as a result the new stock in initial dealings reached a premium of 25s. over the issue price of par (£100). After some switching into the new stock, other long-dated British Funds rallied and showed further gains on balance.

Chemical and allied shares reflected the better tendency in leading industrials, Imperial Chemical moving up to 48s. in anticipation of the full results and annual meeting. Monsanto Chemical have been firm at 57s. 6d., Brotherton 10s. shares 20s. 9d., Albright & Wilson 30s. 6d. and

Bowmans Chemicals 4s. shares were 7s. Dealings started in F. W. Berk 2s. 6d. ordinary around 15s. and in the 4½ per cent £1 cumulative preference shares around 22s. 3d.

Fisons were close on 50s. but, on the reduced profits, Cooper MacDougall & Robertson shares eased to 27s. 6d. British Glues & Chemicals 4s. shares were favoured on expectations of good financial results, and strengthened to 18s. 9d. On the other hand, shares of companies with plastics interests lost further ground. British Xylonite fell heavily from 96s. 3d. to 80s. on the decline in the group's consolidated profits, but later there was a rally to 80s. 6d., the parent company's net profits being little changed and the dividend again 20 per cent. Kleemann were 14s. 6d. awaiting the interim dividend announcement, but British Industrial Plastics 2s. shares at 5s. 10½d. showed little movement on balance, and De La Rue have been steadier at 36s. In anticipation of the annual meeting, British Oxygen firmed up to £5, and United Molasses on the higher profits announced for the past year were active around 47s. The 4s. units of the Distillers Co. changed hands around 27s. 9d. British Plaster Board have been steady at 23s. 3d. and, pending the results, Associated Cement remained firm at 81s. 3d. while Rugby Cement 5s. shares firmed up to 18s. on the chairman's spirited remarks on nationalisation and the decision to oppose the threat of State control by all legitimate means.

Elsewhere, Babcock & Wilcox were active up to 71s. 9d. earlier in the week in anticipation of the financial results, Stewarts & Lloyds at 57s. have been firm on the higher profits, while Tube Investments were higher at £6⅜. In other directions, Turner & Newall also rose to 79s. 3d., Dunlop Rubber were up to 69s. 6d., Pressed Steel 5s. shares were 28s. 3d. on the larger profits, General Refractories at 24s. 9d. responded to the statements at the annual meeting, and steadiness was shown by Borax Consolidated at 53s. and by British Aluminium at 47s. 3d.

Boots Drug have been favoured up to 55s. on market expectations of good financial results due to expansion of business from the National Health Service, and on talk of more capital which might be raised by an offer to shareholders on favourable terms. Sangers were 31s. 10½d., Staveley good at 86s. 6d. and Guest Keen higher at 48s. 9d. Triplex Glass 10s. shares firmed up to 22s. United Glass Bottle were very firm on the good results for 1948 and the chairman's statement that so far in the current year output and turnover have been well maintained with unexecuted orders somewhat higher than a year ago. Oil shares have been uncertain, but Anglo-Iranian rallied slightly to £8 5/32, and C. C. Wakefield rose to 75s. 7½d. in anticipation of the financial results.

British Chemical Prices

Market Reports

THERE have been no major changes in conditions on the week and reports from the industrial chemicals market show a fairly active demand in most sections. Delivery specifications under existing contracts have been fully up to schedule and there has also been a steady flow of new business for the home consuming industries. Buying for export continues to be fairly buoyant. Among the non-ferrous metal compounds there has been a good call for the white and red leads and for zinc oxide with quotations unaltered. There is nothing new to report on the potash chemicals which continue in strong request. There has been little alteration in the routine demand for the soda compounds and the supply position, with the exception of chlorate of soda, is understood to be somewhat easier. The quotations for borax and boric acid have been revised to slightly lower levels. The coal-tar products market remains fairly quiet although the demand for the light distillates has been brisk. A good home demand for creosote oil is also reported.

MANCHESTER.—Prices have been held in most sections of the Manchester chemical market during the past week, the most important changes being reductions ranging from £1 10s. to £4 per ton in the quotations for the commercial qualities of borax and boric acid. Conditions in the home-trade section of the market are steady, both from the point of view of the volume of new business and the flow of delivery specifications, and a fair amount of buying interest on export account is also being displayed. In some sections of the fertiliser market, including superphosphates and the compounds, substantial tonnages are still being called for. Conditions in the by-products market are patchy still, the demand being most active in the case of the light distillates.

GLASGOW.—In the Scottish chemical market the recent trend of price decreases has continued, and the volume of business transacted has again shown a slight rise. The general position is much more satisfactory than a month ago. There has been no outstanding demand apart from the increasing call for the best qualities of whiting. The export market has been subdued, with nothing to report.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2 at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Manufacture of sulphur-containing organic polymers.—Dunlop Rubber Co., Ltd., and M. Goldstaub. May 4, 1946. 618,440.

Extraction of oil from nuts, seeds and the like.—J. Bibby & Sons, Ltd., and J. E. Bibby. May 8, 1946. 618,780.

Process of purifying aromatic hydrocarbons.—Carnegie-Illinois Steel Corporation. Sept. 11, 1945. 618,447.

Manufacture of organic sulphur-containing polymers and cold setting products obtained therefrom.—Dunlop Rubber Co., Ltd., and M. Goldstaub. May 29, 1946. 618,449.

Production of corrosion resistant coatings on ferrous alloy parts such as poppet valves for internal-combustion engines.—W. T. Davies, H. E. Gresham, and M. A. Wheeler. June 4, 1946. 618,607.

Methyl silicone elastomers containing bonded vinyl radicals.—British Thomson-Houston Co., Ltd. June 11, 1945. 618,451.

Preparation of methyl silicone gums and elastomers. British Thomson - Houston Co., Ltd. June 11, 1945. 618,452.

Methyl silicone gums and elastomers.—British Thomson-Houston Co., Ltd., June 11, 1945. 618,453.

Preparation of alkenyl-substituted chlorosilanes.—British Thomson-Houston Co., Ltd. June 11, 1945. 618,608.

Synthesis of hydrocarbons and other compounds from mixtures of carbon monoxide and hydrogen.—Anglo-Iranian Oil Co., Ltd., S. F. Birch, and J. Babeshaw. June 12, 1946. 618,455.

Organo-siloxanes and method of making same.—J. G. Fife. (Dow Chemical Co.) June 20, 1946. 618,459.

Process for refining refractory carbides.—Soc. de Carbone-Lorraine. Aug. 4, 1941. 618,527.

Diathermic seaming apparatus.—P. R. T. Laboratories, Ltd., and O. J. Russell. July 8, 1946. 618,464.

Production of optical elements.—I.C.I., Ltd., and A. White. July 16, 1946. 618,787.

Metallurgy.—M. J. Udy. Sept. 19, 1945. 618,467.

Extrusion apparatus.—B.X. Plastics, Ltd., and D. C. Nicholas. July 30, 1946. 618,536.

Processes for applying pigments to the surfaces of thermoplastic materials.—D. O. Ford. May 16, 1946. 618,614.

Optical glass.—Corning Glass Works. May 27, 1946. 618,656.

Production of optical elements.—I.C.I., Ltd., C. H. Crooks, and W. A. Greenwood. Sept. 2, 1946. 618,477.

Manufacture of biguanide derivatives.—I.C.I., Ltd., A. F. Crowther, F. H. S. Curd, and F. L. Rose. Feb. 1, 1947. 618,613.

Electrolytic recovery of zinc.—Hudson Bay Mining & Smelting Co., Ltd. Oct. 5, 1945. 618,682.

Stabilisation of nuclear chlorostyrenes.—Mathieson Alkali Works. Oct. 30, 1945. 618,478.

Air filtering apparatus.—A. N. Brand. Sept. 7, 1946. 618,685.

Silicone polymers.—Westinghouse Electric International Co. June 2, 1945. 618,480.

Acrylate ester polymers.—J. C. Arnold. (Standard Oil Development Co.) Oct. 2, 1946. 618,691.

Process for obtaining sulphuric acid and common salt by treatment of solid sodium sulphate and /or bisulphate with hydrochloric acid.—Krebs & Co., Ltd. June 18, 1946. 618,548.

Production of mixtures of aromatic hydrocarbons.—Internationale A.G., für Gassynthesen. Oct. 17, 1945. 618,693.

Heat-resistant machinable alloy with high strength while hot.—Kanthal A/B. Nov. 2, 1945. 618,560.

Electric welding systems.—General Electric Co., Ltd., E. S. Friedlander, and C. R. Dunham. Nov. 6, 1946. 618,630.

Apparatus for heating air or other gaseous fluids.—Heat Exchangers, Ltd., and D. W. Rudorff. Nov. 6, 1946. 618,632.

Manufacture of viscose articles, for example, artificial filaments.—British Celanese, Ltd. Nov. 29, 1945. 618,633.

Method for the production of 3-indole aldehyde.—A. Abbey. (Dow Chemical Co.) Nov. 6, 1946. 618,638.

Soil compaction and stabilisation.—Amber Chemical Co., Ltd., and B. L. P. Anthony. Nov. 6, 1946. 618,639.

Curing of concrete.—Amber Chemical Co., Ltd, and B. L. P. Anthony. Nov. 6, 1946. 618,640.

Aluminium base alloy.—T. F. Bradbury. Nov. 9, 1946. 618,700.

Colouring and protection of metals and alloys.—United Chromium, Inc., and J. E. Stareck. Nov. 11, 1946. 618,667.

Derivatives of 5-aminouracil.—Wellcome Foundation, Ltd. (Burroughs Wellcome & Co. (U.S.A.), Inc.) Nov. 12, 1946. 618,826.

Method for the production of niobium-containing steel.—C. Sykes, and D. Wright. [Legal representative of C. W. Wright (deceased)], and C. Stokes. Nov. 11, 1946. 618,820.

Process for dyeing polyvinyl derivatives.—Soc. Rhodiaceta. Dec. 27, 1945. 618,829.

Process for the preparation of oximes from cyclic ketones—Algemeene Kunstzijde N.V. March 5, 1946. 618,838.

Polymers of ethylene.—E. I. Du Pont de Nemours & Co. Nov. 15, 1945. 618,839.

Waste water gulleys.—W. M. Knight. Nov. 19, 1946. 618,722.

Apparatus for extracting oils or fats from solids.—J. Fretwell. Nov. 22, 1946. 618,491.

Anti-splash devices for liquid dispensing-apparatus.—Minimax, Ltd., A. Young, and E. F. Young. April 8, 1946. 618,762.

Furnaces and the production of controlled atmospheres therein.—A. H. Stevens (Metallurgical Processes Co.). March 21, 1944. 619,039.

Alloys.—New Jersey Zinc Co. June 24, 1944. 619,129.

Pest-control compositions and their application.—J. R. Geigy, A.G. August 29, 1944. 618,858, 618,950.

Bitumen treating agent.—T. Swan & Co., Ltd. December 8, 1942. 619,219.

Carbon black.—C. H. Champion & Co., Ltd., and L. Koppel. Jan. 3, 1946. 618,955.

Comparison microscope.—W. F. Klemm. Jan. 18, 1945. 619,044.

Process for obtaining chromium salts and chromic acid.—S. Payne. June 2, 1945. 619,134.

Apparatus for producing glass fibre strands and strands of fibres of material having drawing characteristics similar to those of glass.—A. P. Thurston (Owens-Corning Fiberglass Corporation). Feb. 28, 1946. 619,051.

Apparatus for applying paints or pigments to paper card or other sheets.—Naamlooze Vennootschap Kleuren Staalkaartenfabriek Multicolor V. H. R. Borst & Co. March 21, 1940. 618,961.

Treating carbon articles.—National Carbon Co., Inc. May 22, 1945. 619,053.

Distilling plants for tar, oils and like liquid hydrocarbons.—T. O. Wilton. May 27, 1946. (Addition to 536,321.) 619,230.

Catalytic polymerisation of olefins.—Phillips Petroleum Co. June 15, 1945. 619,231.

Method of producing a mono-carboxylic acid.—A. F. Burgess (Institute of Paper Chemistry). July 1, 1946. 619,063.

Manufacture of N : N¹-alkylenebenzimedazolocyanine dyes.—Kodak, Ltd. (Eastman Kodak Co., and L. G. S. Brooker). July 23 1946. 618,889.

Manufacture of 2 : 6-dimethyl-pyridine-3-carboxylic acids.—Therapeutic Research Corporation of Great Britain, Ltd., V. Petrow, and E. L. Rewald. Nov. 18, 1946. 619,241.

Method of stabilising an aqueous solution of ascorbic acid (vitamin C).—Abbott Laboratories. Feb. 4, 1946. 619,065.

Tri-heterocyclo-substituted methanes.—J. D. Kendall, and H. D. Edwards. Aug. 13, 1946. 618,894.

Clarification of coal washery effluent.—Imperial Chemical Industries, Ltd., and J. E. Edwards. Aug. 14, 1946. 618,895.

Insecticides, fungicides and the like.—Pan Britannica Industries, Ltd., and E. J. N. Cakebread. Sept. 3, 1946.

Printing members and methods of making the same.—B.B. Chemical Co., Ltd. Oct. 10, 1945. 619,076.

Treatment of polyvinyl chloride.—J. Downing. Oct. 9, 1946. 618,902.

Treatment of tows of textile material.—Courtaulds, Ltd., R. L. Wormell, and A. F. Millidge. Nov. 13, 1946. 618,925.

Removal of solvents from chlorinated paraffin wax.—Imperial Chemical Industries Ltd., and W. Bridge. Nov. 13, 1946. 618,926.

Surface treatment of aluminium and aluminium alloys.—British Aluminium Co., Ltd., and A. N. D. Pullen. Nov. 13, 1946. 618,931.

Welding.—Electric Furnace Co., Ltd. (Ohio Crankshaft Co.). Nov. 15, 1946. 618,979.

Purification of benzene hexachloride.—Imperial Chemical Industries, Ltd., and L. J. Burrage. Nov. 18, 1946. 618,994.

Production of dextran from sucrose by means of dextran-forming bacteria.—W. N. Haworth and M. Stacey. Nov. 18, 1946. 618,999.

Decarboxylation of 1 : 3-dialkyl-pyridofluorenenone-4-carboxylic acids.—Therapeutic Research Corporation of Great Britain, Ltd., and V. Petrow. Nov. 18, 1946. 619,087.

Process for the manufacture of gasoline.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Dec. 8, 1945. 619,000.

Purification of acetic anhydride.—Courtaulds, Ltd., and J. G. Spencer. Nov. 19, 1946. 619,008.

Process for the production of unsaturated alcohols.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Dec. 8, 1945. 619,014.

Stabilisation of aromatic amines.—J. C. Arnold (Standard Oil Development Co.). Nov. 19, 1946. 619,018.

Corrosion inhibitors.—Merck & Co., Inc. Nov. 30, 1945. 619,019.

Filters for gaseous fluids.—S. Morel. Nov. 30, 1945. 619,184.

Boots

Fine chemicals

Boots Pure Drug Co. Ltd. are manufacturers of the following Chemicals. Each product is subjected to strict analytical control, and represents a high standard of quality and purity.

Acetanilide Technical.
Acetanilide B.P.C.
Acetarsol B.P.
Acetarsol Sodium.
Acetomenaphthone B.P.
Acetylsalicylic Acid B.P.
p-Aminobenzoic Acid.
Amylmetacresol.
Battery Compound B.P.D. 116.
Benzyl Cyanide Technical.
Bismuth Carbonate B.P. Light & Heavy.
Bismuth Salicylate B.P.
Bismuth Subnitrate B.P.C.
Chloramine B.P.
Chloramine Technical and Commercial.
Chloroform B.P.
Dienoestrol B.P.
Diethyl Malonate.
Ethyl Cyanacetate.
Glycerophosphoric Acid B.P.C.
Guanidine Nitrate Technical.
Hexobarbitone B.P.
Hexobarbitone Sodium B.P.
Hexœstrol B.P.
Hexyl-Resorcinol B.P.C.
Hydroxylamine Hydrochloride.
Iodine B.P.
Iodoform B.P.
Heavy Magnesium Carbonate B.P.
Malonic Acid.
Manganese Dioxide, Black precipitated.
Menaphthone B.P.
Methyl Iodide.
2-Methyl-β-Naphthothiazole.
α-Naphthylacetic Acid.
Nicotinamide B.P.
Nicotinic Acid B.P.
Nikethamide B.P.
Phenobarbitone B.P.
Phenobarbitone Sodium B.P.
Phenytoin Sodium B.P.
Potassium Citrate B.P.
Potassium Iodide B.P.
Potassium Permanganate.
Sodium Citrate B.P.
Sodium Glycerophosphate B.P.C.
Sodium Iodide B.P.
Stilbœstrol B.P.
Stilbœstrol dipropionate B.P.C.
Sulphacetamide B.P.
Sulphacetamide Sodium B.P.
Sulphaguanidine B.P.
Sulphanilamide B.P.
Sulphathiazole B.P.
Sulphathiazole Sodium B.P.
p-Toluenesulphonamide Technical
p-Toluenesulphonchloride Commercial.
p-Toluenesulphonic Acid : Commercial.

Further information will gladly be sent on request to the Wholesale Department.

BOOTS PURE DRUG CO. LTD. NOTTINGHAM ENGLAND. Phone: Nottingham 45501

LONDON SALES OFFICE: 71 FLEET STREET, LONDON E.C.4. (Phone: Central 6901)

B.I.F. NEWS AND VIEWS

(*Concluded from page 684*)

found by Boots Pure Drug Co., Ltd., Station Street, Nottingham (Stand B2) to have valuable peace-time application in the treatment of various diseases. The substance is known as DFP (di-isopropyl-fluoro-phosphonate) and it was never used for its original purpose. Three conditions have been treated with DFP. (1) Glaucoma—a disease due to increase in the fluids on the eyeball, raising intra-ocular pressure; treatment takes the form of applying DFP in arachis oil in the form of eye drops. (2) Myasthenia gravis—a disease characterised by progressive muscular weakness; the treatment consists of administering DFP by injection. (3) Paralytic ileus—or paralysis of the small intestine.

To overcome the need for frequent dosing of penicillin The Distillers Company (Biochemicals), Ltd., Fleming Road, Speke, Liverpool 19 (Stand B26) has introduced a new form of penicillin which is being displayed. The action of the new chemical, in suitable suspension, is prolonged and results in the maintenance of an effective level in the bloodstream over as long a period as 36 hours.

A constituent of slug and snail poisons which can also be used as a solid fuel is presented by British Industrial Solvents, Ltd., 4 Cavendish Square, London, W.1 (Stand B26). The firm claims to be the only Commonwealth manufacturer of metaldehyde which is widely used as a solid fuel and is also the active constituent of a number of garden pest destroyers.

Kaylene, Ltd., Waterloo Road, Cricklewood, London, N.W.2 (Stand B55) is exhibiting an entirely new scientific instrument called a "halometer" which has been designed for the rapid and accurate measurement of the red cells in human blood. The measurement of the diameter of blood cells by halometry depends on laws of diffraction. When a small source of light is viewed through a thin blood film on a glass slide, a circular coloured pattern, or halo, is seen. The angular diameter of this halo is inversely proportional to the diameter of the blood cells, and it is this which the halometer measures.

Canadian Chemical Imports.—The following figures show some of the principal chemical and allied products imported into Canada in January, compared with the same month last year: Inorganic chemicals, n.o.p. 1792 (1153); acids 349 (336); dyeing and tanning materials 919 (714); synthetic resins and products 1049 (1384); drugs and medicines 1128 (907); paints and varnishes 1121 (1195); other chemical products 3223 (2992).

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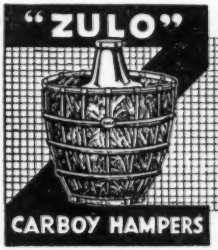
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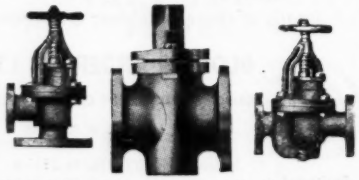
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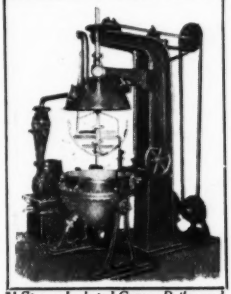
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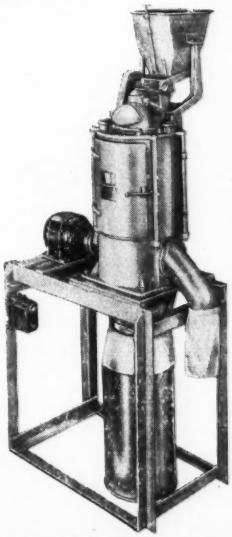
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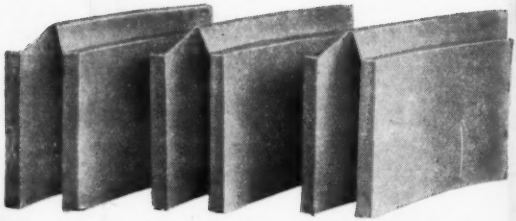
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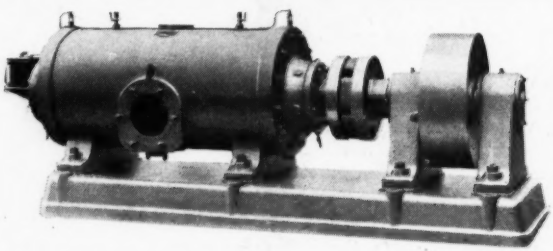
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